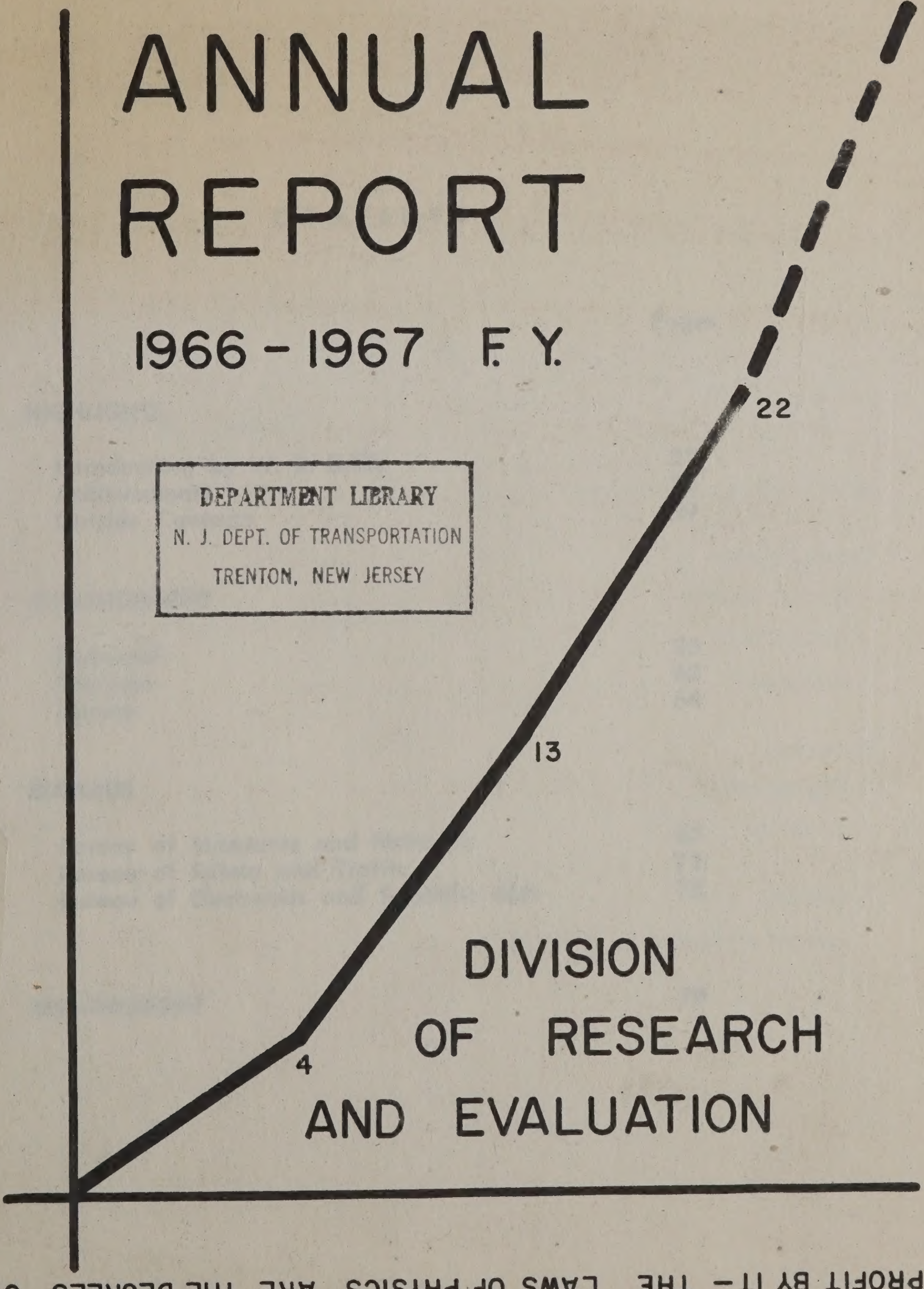
Librarian

FATE — ACCEPT NO PROPOSITION THAT CANNOT BE CONFIRMED BY EXPERIMENT, THE ONLY BASIS OF CERTAINTY — THE OBJECT OF SCIENCE IS WHAT IS — NEVER ASK THE TRUTH WHENCE IT COMES OR WHERE IT GOES NOR ABOVE ALL WHO IS TO PROFIT BY IT — THE LAWS OF PHYSICS ARE THE DECREES OF

ANNUAL REPORT

1966 - 1967 F. Y.



DEPARTMENT LIBRARY
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DIVISION OF RESEARCH AND EVALUATION

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NEW JERSEY DEPARTMENT OF TRANSPORTATION

NJDOT RESEARCH LIBRARY

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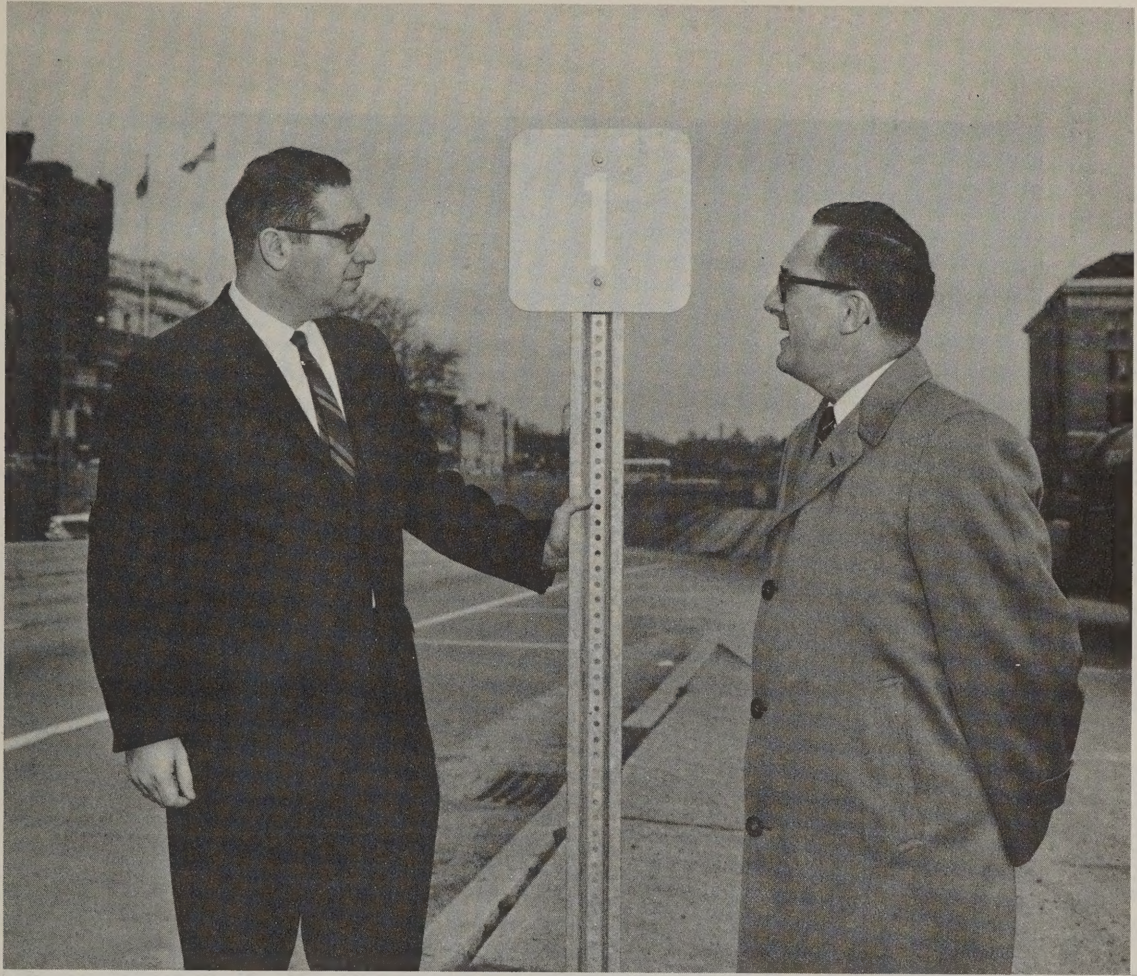
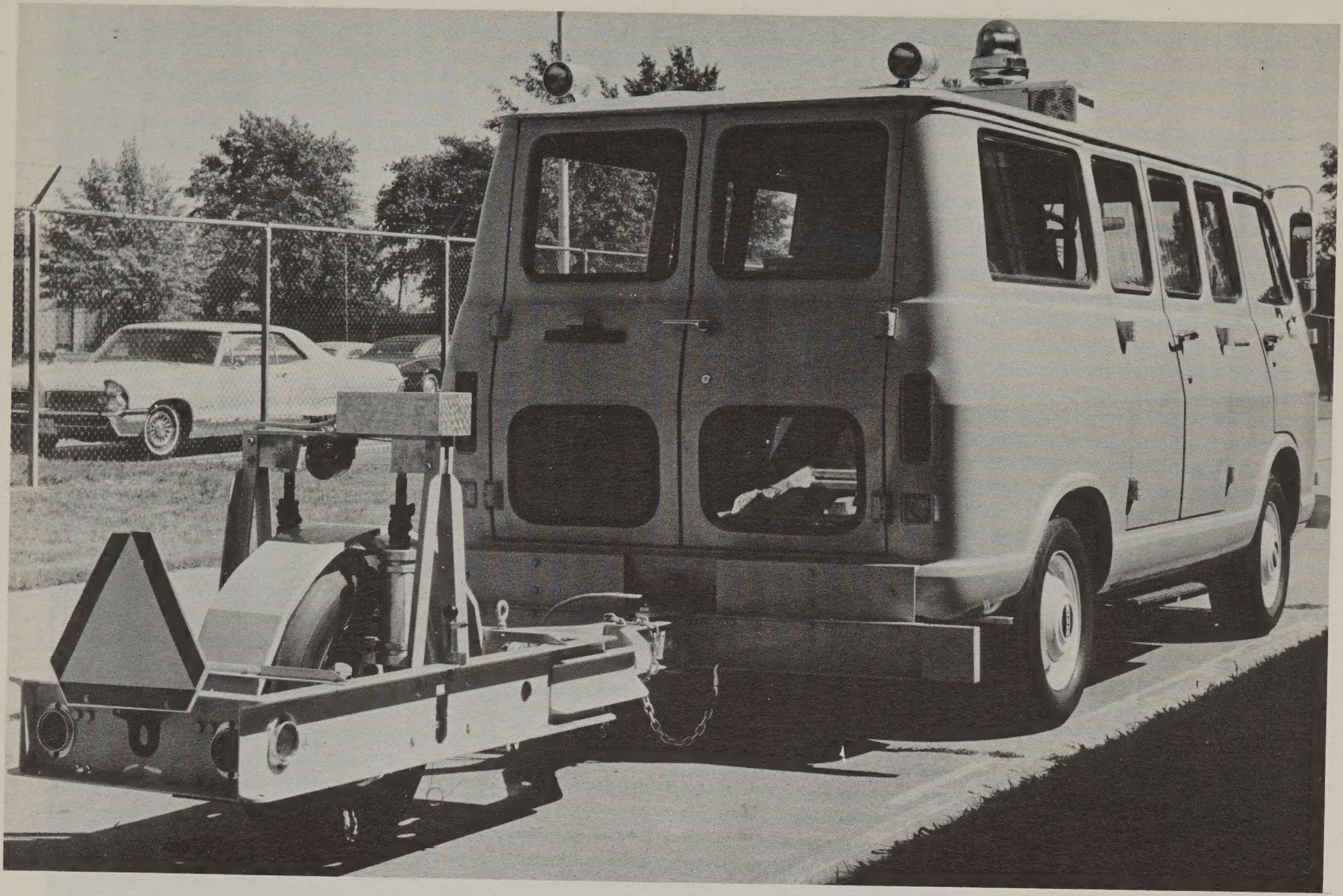
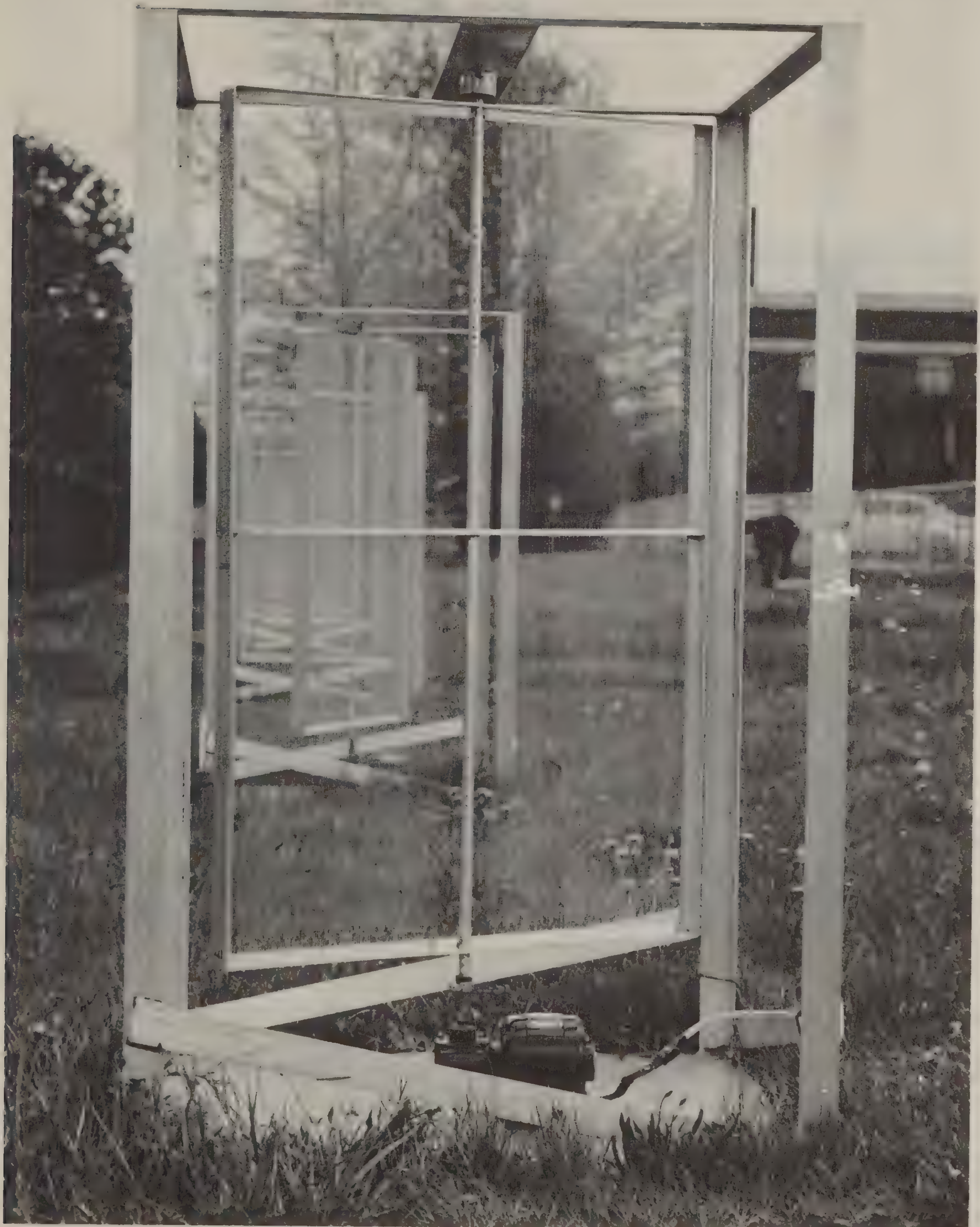


INAUGURATION OF THE FIRST MILEPOST BY COMMISSIONER DAVID J. GOLDBERG AND STATE HIGHWAY ENGINEER JAMES R. SCHUYLER. BY COINCIDENCE, THE FIRST OF 3,546 POSTS WAS INSTALLED AT MILE 1 ON ROUTE 1, AT EAST FRONT STREET IN DOWNTOWN TRENTON, ON MARCH 27, 1967.

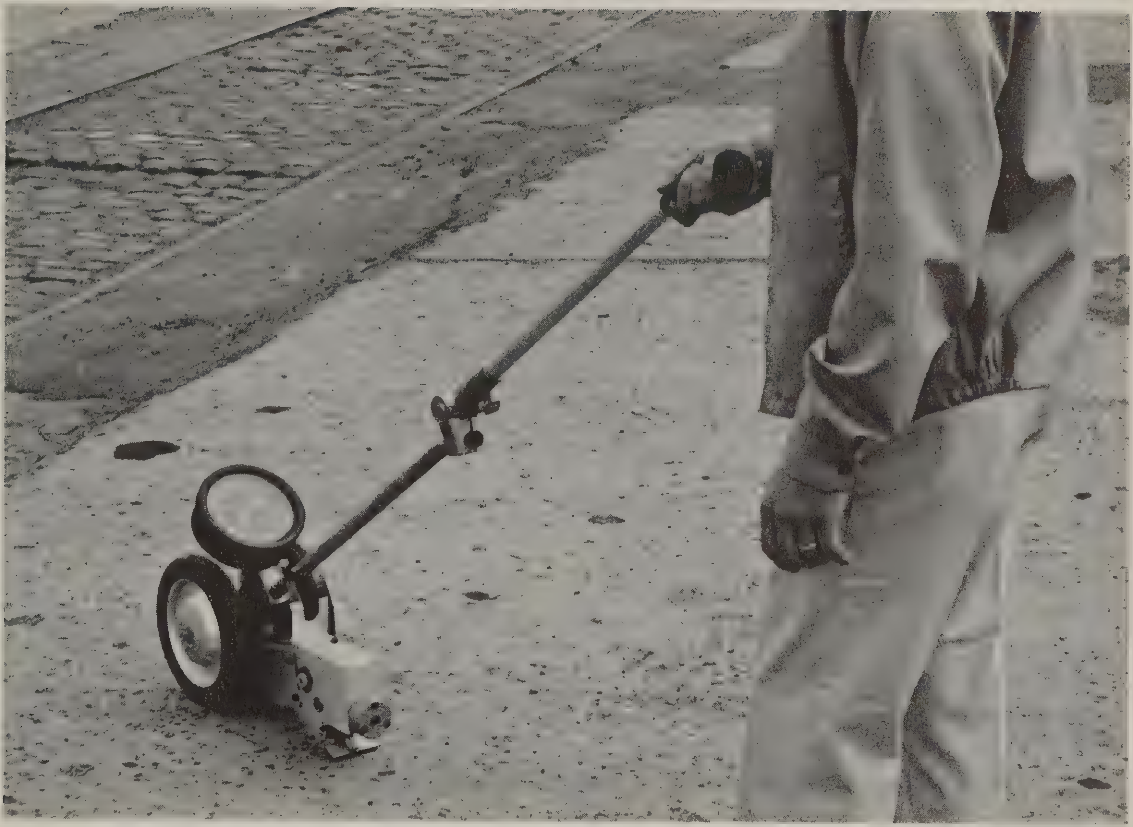
THE LAST ONE WENT INTO PLACE AT MILE 60 OF U.S. ROUTE 22 AT NEWARK JUNCTION ON AUGUST 9, 1967, COMPLETING THE MILEPOST SYSTEM ON ALL STATE-CONTROLLED ROADS EXCEPTING THE INTERSTATE ROUTES. IT PROVIDES AN ACCURATE METHOD OF LOCATING HIGH-ACCIDENT SPOTS AND A BASIS FOR THE DEVELOPMENT OF PREVENTIVE MEASURES.



THE DEPARTMENT'S ROAD ROUGHNESS INDICATOR OR "ROUGHOMETER", RECENTLY RECEIVED, IS DESIGNED TO SENSE, MEASURE AND RECORD THE RIDING CHARACTERISTICS OF PAVEMENTS. BESIDES BEING AN AID TOWARD IMPROVING THE RIDING QUALITIES OF THE ROADWAYS, IT IS EXPECTED TO HELP IN LENGTHENING THEIR USEFUL LIFE.

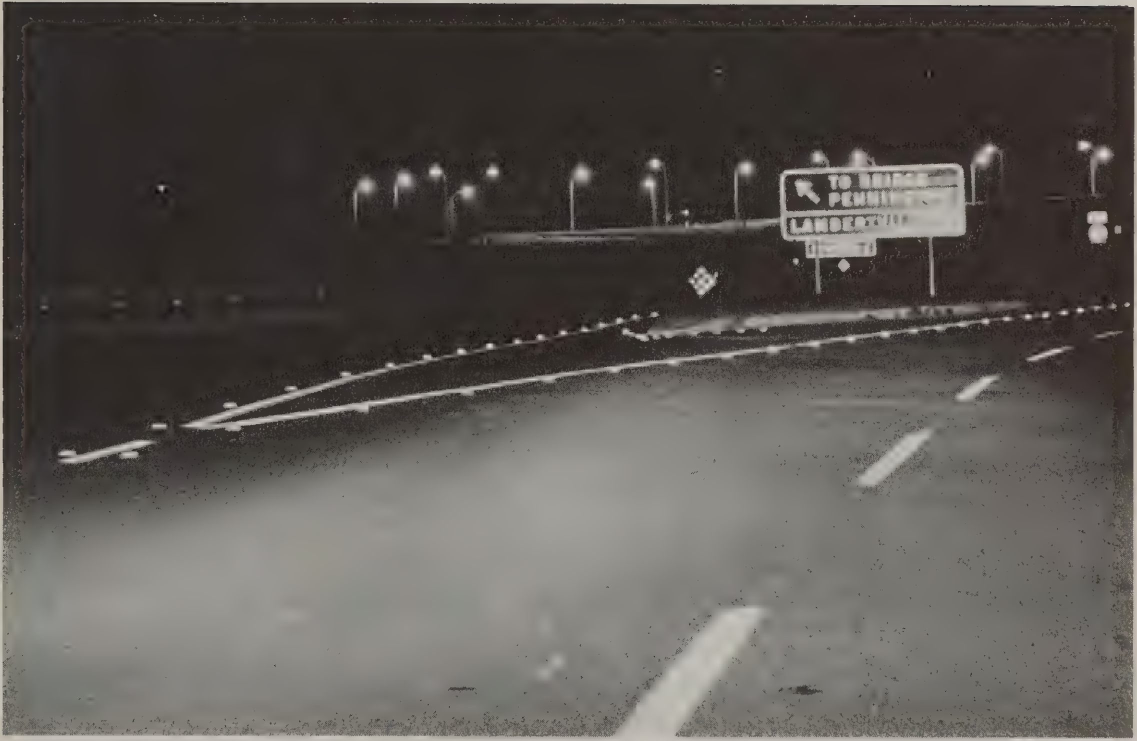


FOLLOWING THE SUCCESSFUL COMPLETION OF THE INDOOR EXPERIMENTS IN THE ENVIRONMENTAL FOG CHAMBER AT THE MERCER COUNTY AIRPORT, THE INSTALLATION OF A SET OF 20 FOG-DISPERSING UNITS WAS COMPLETED ON JULY 1, 1967, AT FERNWOOD, FOR OUTDOOR TESTS.

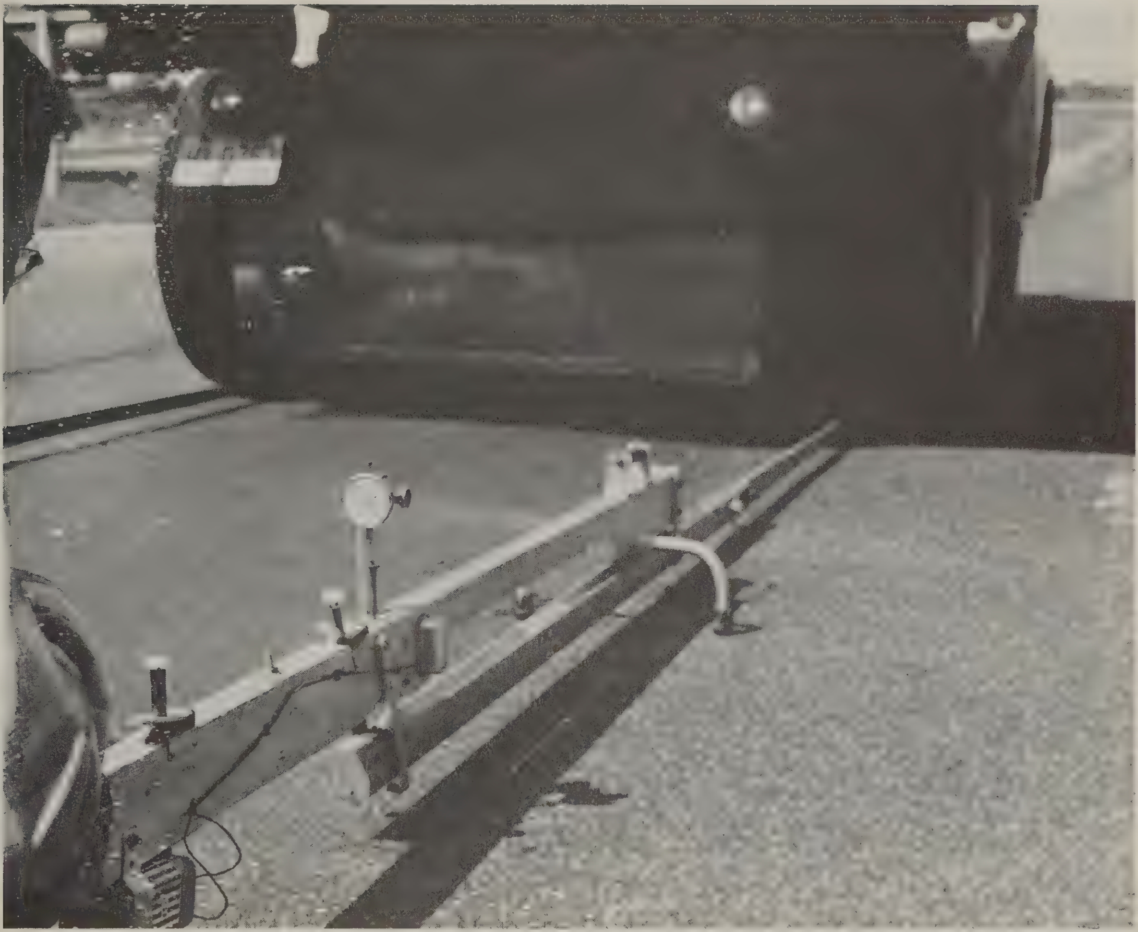


ESSENTIAL FIELD TESTS WERE MADE WITH THE ABOVE INSTRUMENT DURING THE FISCAL YEAR, FOR THE RECENTLY COMPLETED DOLOMITE AGGREGATE STUDY. IT IS A PORTABLE DIE-A-MATIC SKID RESISTANCE TESTER WHOSE DIAL SHOWS, IN DTN OR "DRAG TEST NUMBERS", THE RELATIVE NON-SLIPPERINESS OF ROADWAYS.

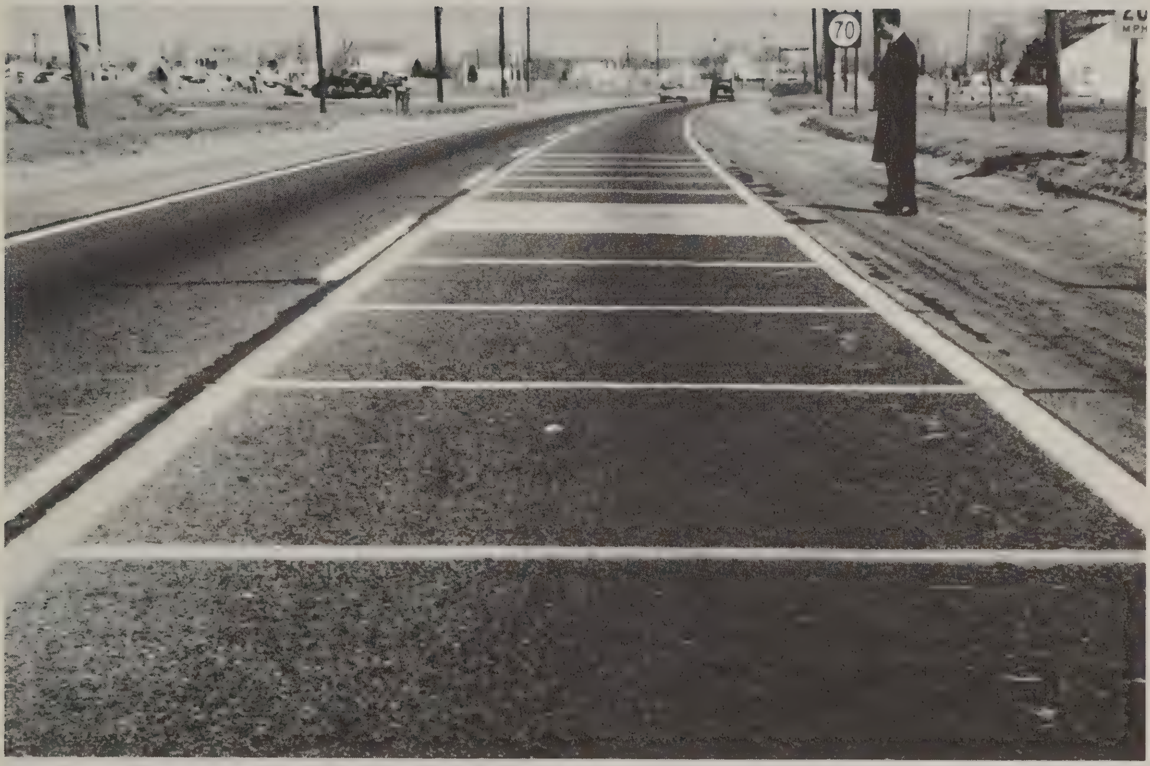
DELIVERY OF A MORE ELABORATE SKID TESTER, COMPRISING A SPECIAL TRUCK WITH A SKID TRAILER, IS IMMINENT. IT WILL MAKE POSSIBLE A SYSTEMATIC ATTACK ON THIS MOST SERIOUS PROBLEM.



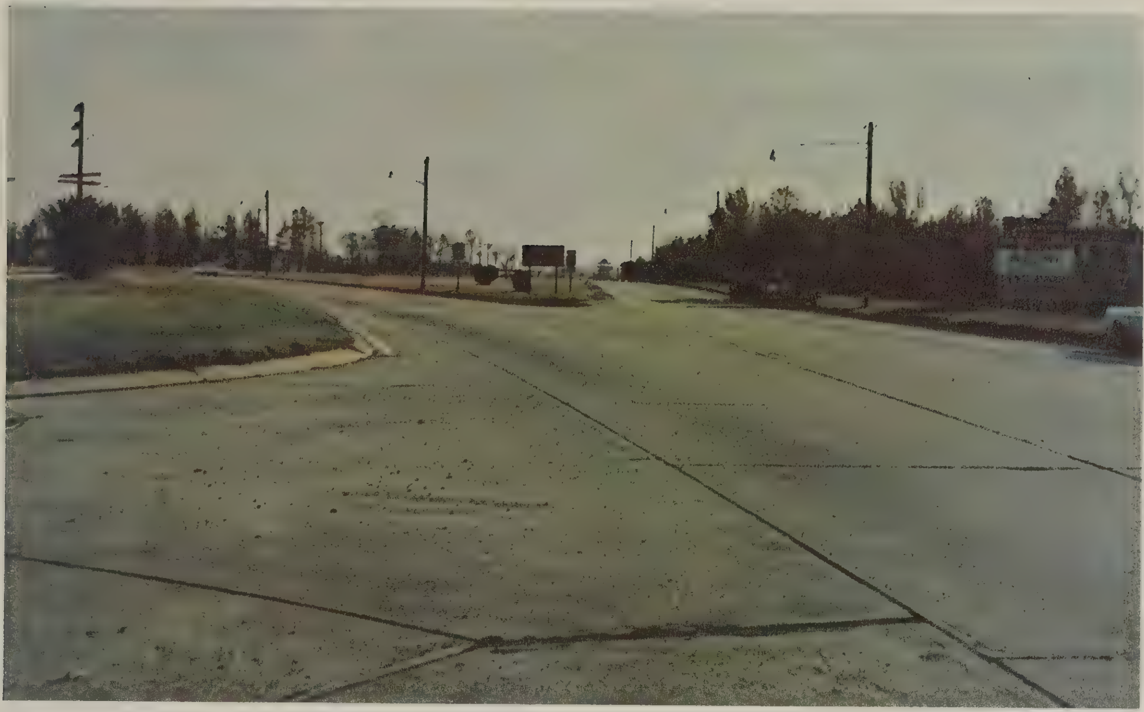
THESE REFLECTIVE PAVEMENT MARKERS, PART OF A LARGER GROUP INSTALLED ON ROUTE 29 NORTHBOUND, HAVE ALREADY PROVED THEIR SUPERIORITY TO NORMAL PAINT MARKINGS FOR DELINEATING THE GORE AREA. THEY ARE PARTICULARLY EFFECTIVE AT NIGHT.



THIS BENKELMAN BEAM IS USED AT PRESENT TO MEASURE ROADWAY DEFLECTIONS UNDER A LONG-TERM PROJECT OF TESTS ON EXPERIMENTAL PAVEMENT SECTIONS OF ROUTES 80 (5V) AND 95 (1R). THE FIFTH CAMPAIGN OF TESTS WILL GET UNDERWAY THIS FALL.

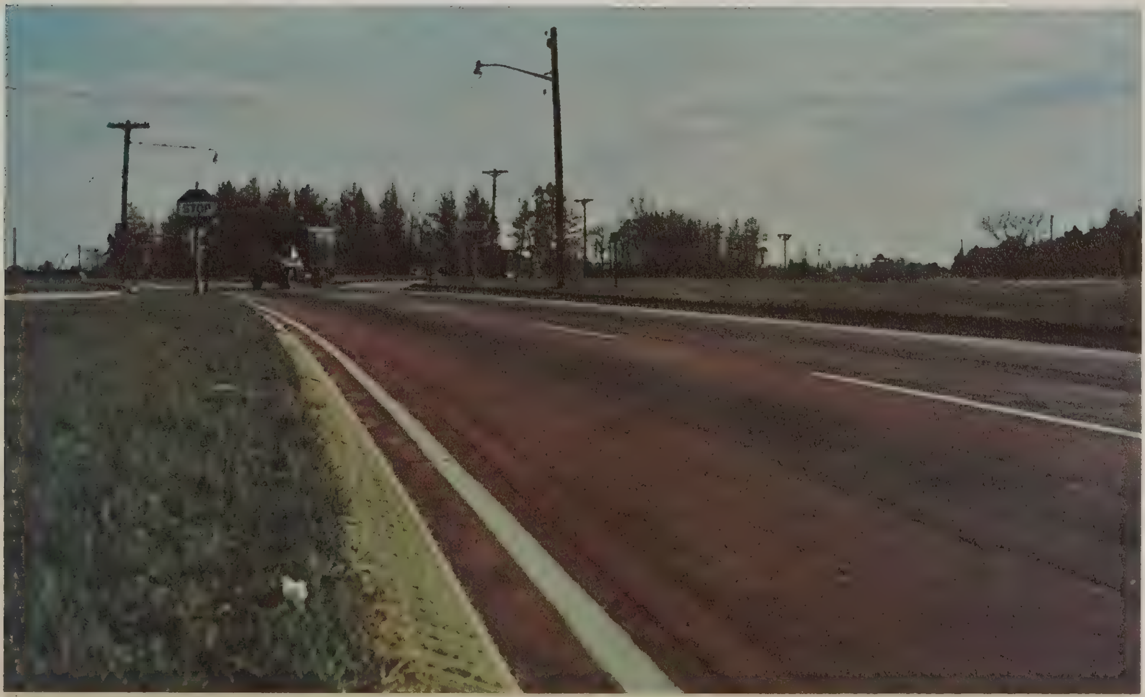


AFTER NEARLY TWO YEARS OF USE OF THE RUMBLE STRIPS INSTALLED IN OCTOBER 1965, THE DIVISION OF MOTOR VEHICLES RECENTLY REPORTED A DECISIVE IMPROVEMENT OF THE ACCIDENT RECORD OF ROUTE 206 ON THE SOUTHERN APPROACH TO THE RED LION CIRCLE.



THE ABOVE INTERSECTION OF U.S. 206 AND N.J. 68 IN MANSFIELD TOWNSHIP, BURLINGTON COUNTY, WAS SELECTED FOR AN EXPERIMENTAL INSTALLATION OF COLORED PAVEMENT.

THE PHOTO BELOW SHOWS THE 3/4" RED ASPHALT PUT IN PLACE LAST JUNE ON THE SOUTHBOUND RAMP OF ROUTE 206. THE EFFECTS OF THE TREATMENT ARE UNDER OBSERVATION.



HIGHLIGHTS

INTRODUCTION

BY W. R. BELLIS

RESEARCH IS A PLANNED EFFORT TO DISCOVER OR DEVELOP WAYS TO MAKE SOME THING OR SOME PROCESS BETTER. THE URGENCY FOR SUCH RESEARCH IS STIMULATED BY THE NEED OF THE FUTURE AS DICTATED BY AMBITIONS OF A SOCIETY OR AN INDIVIDUAL.

ANYTHING THAT MEN CAN IMAGINE AND FOR WHICH THEY ARE WILLING TO PAY A PRICE CAN BE ACCOMPLISHED. BEFORE A COMMITMENT CAN BE MADE TO PAY THIS PRICE, IT MUST BE ASCERTAINED THAT THE RESEARCH EFFORT EMBODIES A HIGH PROBABILITY OF RESULTS WHICH ARE MUCH MORE DESIRABLE THAN THE CONDITIONS WHICH EXIST WITHOUT THIS RESEARCH EFFORT.

GROWTH INDICATES A PROGRESSIVE SOCIETY. IT IS CERTAIN THAT IN NEW JERSEY, AND IN THE UNITED STATES, POPULATION AND TRAFFIC VOLUMES WILL CONTINUE TO GROW. A PROJECTION OF THE PAST AND CURRENT TRENDS IN ACCIDENTS, INJURIES AND FATALITIES, INDICATE A CONTINUED GROWTH FAR IN EXCESS OF THAT DESIRED. THIS CAN BE ANTICIPATED, UNLESS EFFORTS ARE EXERTED FAR GREATER THAN THOSE UNDER DISCUSSION AT THE PRESENT TIME. BUT THE FUTURE OUTLOOK IS SO HORRIFYING THAT MOST PEOPLE WILL CLOSE THEIR EYES ON IT AND SAY THAT IT CAN'T BE SO, JUST AS AN OSTRICH IS SAID TO REACT.

IF WE ARE TO MAINTAIN A PROGRESSIVE SOCIETY, WE MUST BE PREPARED TO COPE WITH THE PROBLEMS OF THE FUTURE. THE POPULATION IN THE UNITED STATES HAS BEEN DOUBLING EVERY FORTY YEARS AND CAN BE EXPECTED TO CONTINUE AT THIS SAME RATE. FORTY YEARS FROM NOW, THE UNITED STATES WILL HAVE A POPULATION EQUAL TO THE PRESENT POPULATION OF INDIA, AND EIGHTY YEARS FROM NOW WILL HAVE A POPULATION EQUAL TO THE PRESENT POPULATION OF COMMUNIST CHINA, AT WHICH TIME CHINA'S POPULATION WILL BE EQUAL TO THE PRESENT POPULATION OF THE WORLD, 3 BILLION 200 MILLION. CONTINUING THIS GROWTH, THERE WILL BE, 1,000 YEARS FROM NOW, ONE PERSON FOR EVERY TWO SQUARE INCHES OF LAND AREA IN THE UNITED STATES, INCLUDING ALASKA; AND 2,000 YEARS FROM NOW; THERE WILL BE 15 MILLION PEOPLE PER SQUARE INCH OF LAND AREA. THIS STATEMENT, ITSELF, SHOULD BE ENOUGH TO JUSTIFY THE EFFORTS OF SPACE EXPLORATION. WE MAY SAY "WHO CARES ABOUT 1,000 YEARS FROM NOW?", SO LET US CONSIDER THE YEAR 2025 AT WHICH TIME OUR GRANDCHILDREN WILL BE THE SAME AGE WE ARE TODAY.

NEW JERSEY IS THE MOST DENSELY POPULATED STATE IN THE COUNTRY AND CONTAINS THE MOST DENSELY POPULATED MUNICIPALITY IN THE COUNTRY. NEW JERSEY ALSO RANKS FIRST IN THE NUMBER OF VEHICLES REGISTERED PER SQUARE MILE, THE AVERAGE DAILY TRAFFIC PER MILE OF STATE PRIMARY SYSTEM, THE TRAFFIC VOLUMES PER MILE OF ALL EXISTING ROADS AND STREETS, THE ROADWAY MILEAGE PER SQUARE MILE, AND IS LOCATED IN THE CENTER OF THE GREATEST MEGALOPOLIS IN THE WORLD. NEW JERSEY'S POPULATION IS GROWING FASTER THAN THE AVERAGE FOR THE COUNTRY, IT DOUBLES EVERY THIRTY YEARS. OUR TRAFFIC VOLUME DOUBLES EVERY FIFTEEN YEARS: THE NUMBER OF ACCIDENTS HAS BEEN DOUBLING EVERY TWELVE YEARS; THE NUMBER OF INJU-

RIES DOUBLES EVERY EIGHT YEARS; AND THE NUMBER OF FATALITIES DOUBLES EVERY NINE YEARS. THE ACCIDENT, INJURY AND FATALITY RATES PER 100 MILLION VEHICLE MILES ALSO ARE INCREASING. THE ACCIDENT RATE DOUBLES EVERY THIRTY YEARS; THE INJURY RATE DOUBLES EVERY THIRTEEN YEARS; AND THE FATALITY RATE DOUBLES EVERY FIFTEEN YEARS.

IN THE YEAR 2025, NEW JERSEY'S POPULATION WILL REACH 27 MILLION WHICH IS ABOUT FOUR TIMES OUR PRESENT POPULATION. TOTAL VEHICLE MILES TRAVELED IN THE STATE WILL REACH 536 BILLION VEHICLE MILES, WHICH IS 15 TIMES THAT OF THE PRESENT DAY. THERE WILL BE MORE THAN 5 MILLION ACCIDENTS IN THAT ONE YEAR, THIS IS 31 TIMES AS GREAT AS THE NUMBER OF ACCIDENTS OCCURRING DURING 1966. THERE WILL BE 20 MILLION INJURIES, WHICH IS 169 TIMES AS GREAT AS THE NUMBER OF INJURIES IN 1966. THERE WILL BE 128 THOUSAND FATALITIES FROM MOTOR VEHICLE ACCIDENTS, WHICH IS 114 TIMES AS GREAT AS THE NUMBER OF FATALITIES FOR 1966—A HORRIFYING PICTURE CONFRONTING OUR GRANDCHILDREN . WE MUST FIND WAYS AND MEANS OF AVOIDING THIS CONDITION. SINCERE EFFORTS BY QUALIFIED INDIVIDUALS ARE NECESSARY IF WE ARE TO AVOID THIS APPALLING PROSPECT FOR OUR DESCENDANTS. FOR THIS REASON, GREATER AND GREATER EMPHASIS SHOULD BE PLACED ON RESEARCH. THIS DIVISION IS DEVOTED TO THIS END.

ACHIEVEMENTS

DURING THE FISCAL YEAR, 22 REPORTS, (INCLUDING 4 PAPERS) WERE COMPLETED, COMPARED TO 13 DURING THE PREVIOUS YEAR (AND 4 IN THE DIVISION'S FIRST YEAR). THESE REPORTS ARE LISTED IN THE APPENDED TABLE AND GRAPHS. OUR COVER ILLUSTRATES THE UPWARD TREND. IN ADDITION, TWO SPECIAL PROJECTS WERE UNDERTAKEN:

A SERIES OF NINE ANALYTICAL MAPS SHOWING DIFFERENT CHARACTERISTICS OF OUR STATE HIGHWAYS: NUMBERS OF LANES (DIVIDED AND UNDIVIDED), TYPES OF SURFACINGS, BARRIER CURBS, TRAFFIC CIRCLES, FREEWAYS; REVISED SHORTLY AFTER THE END OF THE FISCAL YEAR.

THE EVOLUTION OF CONSTRUCTION COSTS FROM THREE SEPARATE ANGLES OF APPROACH: THE FOUR MOST RELEVANT NATIONAL PRICE DEFLATORS AND A BROADLY-BASED INDEX DERIVED FROM THE DEPARTMENT'S OWN CONSTRUCTIONS WERE COMPLETED DURING THE FISCAL YEAR; A COMPARISON OF THESE WITH THE ONES OF THE BUREAU OF PUBLIC ROADS WAS ADDED IN SEPTEMBER.

AMONG THE MANY PROBLEMS CONFRONTED BY THE THREE BUREAUS, SKID RESISTANCE WAS ONE OF THE MOST CONSEQUENTIAL. WITH TRAFFIC AND SPEEDS ON THE RISE, THE DANGER DUE ESSENTIALLY TO THE ACCELERATED POLISHING OF THE ROADWAYS GROWS FAST WITH INCREASED USE. AT THE REQUEST OF THE STATE HIGHWAY ENGINEER, THE CHARACTERISTICS OF OUR MOST FREQUENT SUPPLIES OF BITUMINOUS AGGREGATES WERE DETERMINED. AT THE SAME TIME MORE ADVANCED EQUIPMENT WAS PLANNED FOR CONTINUING THE SYSTEMATIC TESTING OF MATERIALS AND THE INSPECTION OF DANGEROUS SECTIONS OF THE STATE'S HIGHWAYS. DELIVERY OF A SKID-TRAILER IS MOMENTARILY EXPECTED.

AS IMPROPER SEALING OF BRIDGE AND HIGHWAY JOINTS CAN CAUSE CONSIDERABLE DANGER, A THOROUGH INVESTIGATION WAS MADE OF THE PERFORMANCE OF ELASTOMERIC SEALS; NEW DESIGN AND CONSTRUCTION METHODS WERE OUTLINED. A PROGRAM OF OBSERVATIONS WILL BE CONTINUED WITH THE FORMULATION OF A COMPREHENSIVE SPECIFICATION IN MIND.

TO IMPROVE SAFETY AT THE APPROACHES TO TRAFFIC CIRCLES AND OTHER HAZARDOUS LOCATIONS, A SERIES OF RUMBLE STRIPS HAD BEEN INSTALLED AT THE RED LION CIRCLE (ROUTES 206 AND 70). THE FINAL STUDY WAS COMPLETED DURING THE FISCAL YEAR, AFTER CONTINUED OBSERVATION HAD CONFIRMED THE EFFECTIVENESS OF THE DEVICE.

WITH THE INCREASED EMPHASIS ON HIGHWAY SAFETY, IT HAD BECOME IMPERATIVE TO LOCATE ACCIDENTS TO WITHIN 0.1 MILE. TO THIS EFFECT A COMPLETE SYSTEM OF MILEPOSTS WAS INSTALLED THROUGHOUT THE STATE HIGHWAYS, TOGETHER WITH AN ACCIDENT ANALYSIS METHOD.

THIRTY INTERSECTIONS HAVE BEEN STUDIED, REPRESENTING THE VARIOUS TYPES USED IN NEW JERSEY, WITH THEIR PHYSICAL CHARACTERISTICS, INCLUDING SIGNING, COLLISION DIAGRAMS, ACCIDENT ANALYSES AND TRAVEL TIME EQUATIONS. THE COMPLETED PROJECT WILL AID THE ENGINEER IN DESIGNING THESE TYPES OF INTERSECTIONS.

THE PRINCIPLE OF COLORED SURFACING IS BEING PUT TO A PRACTICAL TEST TO FIND OUT TO WHAT EXTENT IT WILL SPEED AND SHARPEN THE DRIVERS' PERCEPTION OF THE OUTLINES OF ROADWAYS, RAMPS AND LANES. THE EXPERIMENTAL INSTALLATION IN MANSFIELD, BURLINGTON COUNTY, LOOKS PROMISING BUT SURVEILLANCE CONTINUES.

THE FOG ABATEMENT PROGRAM HAS EXPANDED INTO THE OUTDOOR PHASE, WITH THE COMPLETION OF A TWENTY-UNIT INSTALLATION AT THE FERNWOOD SHOPS. THE TESTING OF THE FULLY AUTOMATIC SYSTEM WILL TAKE PLACE AS SOON AS NATURAL FOG CONDITIONS PERMIT. IN THE MEANTIME, THE MERCER AIRPORT LABORATORY CONTINUES THE SYSTEMATIC STUDY OF VARIABLES FOR THE FURTHER PERFECTING OF THE DEVICE. AFTER THE END OF THE FISCAL YEAR A PORTABLE FOG CHAMBER WAS BUILT AND SUCCESSFULLY USED AT THE N. J. STATE FAIR.

ONE MILE OF A TWO-WIRE RESISTANCE MEASURING ARRANGEMENT WAS INSTALLED IN ORDER TO TRY OUT THIS EMERGENCY CALL SYSTEM. EARLY OBSERVATIONS INDICATE THAT IT WILL WORK OVER EXTENDED INTERVALS. A FULLY OPERATIVE CALL SYSTEM WILL BE INSTALLED FOR FURTHER TRIAL AND EVALUATION.

IN THE FULL SUMMARIES OF PERFORMANCE OF THE THREE BUREAUS, AT THE END OF THIS REPORT, ONLY THE ESSENTIAL PROJECTS ARE MENTIONED, INCLUDING THEIR MANY INCIDENTAL OR CONTINUED ACTIVITIES OF A LESS IMMEDIATE NATURE.

FOR REFERENCE PURPOSES, A COMPLETE RUNNING LIST CAN BE FOUND AT THE END OF THIS VOLUME, OF ALL THE REPORTS AND PAPERS PUT OUT BY THIS DIVISION SINCE ITS INCEPTION.

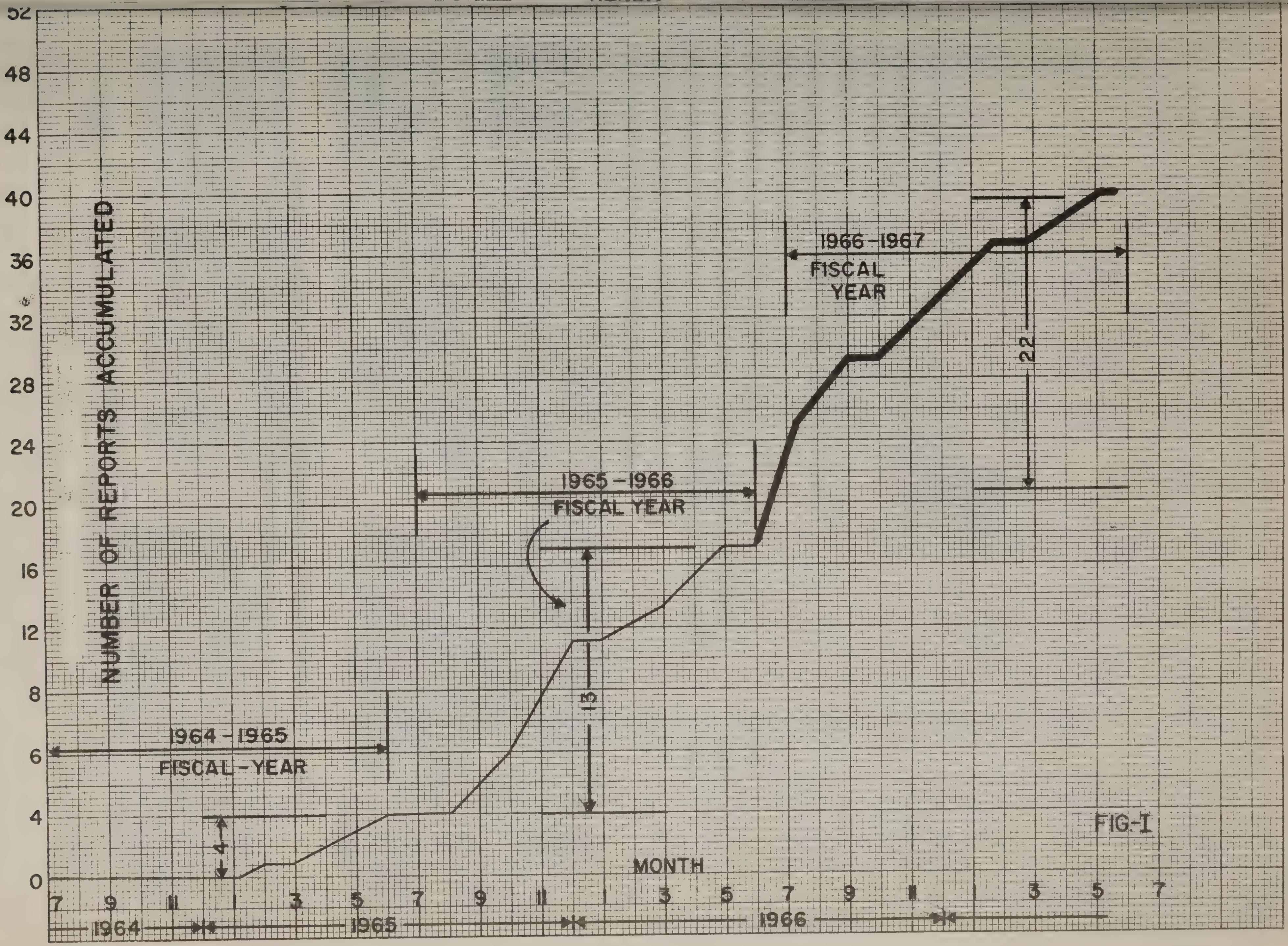
DORE

TABLE I

FISCAL YEAR 1966-1967

REPORTS PREPARED BY THE DIVISION OF RESEARCH AND EVALUATION

REPORT NUMBERS	TITLES	BUREAUS		
		S.M.	S.T.	E.S.A.
19.	Signalized Intersection Accident Report, '64		X	
20.	Summary of Sufficiency, Rating Elements		X	
21.	Socio-Economic Impace of Verrazano Narrows Bridge		X	
22.	30th Peak Hour Factor Trends		X	
23.	An Evaluation of New Pedestrian-Actuated Signal		X	
24.	Truck Equivalent (Report & Paper)		XX	
25.	Evaluation of Studded Tires (Report and Paper)	XX		
26.	Progress Report on Fog Removal Experiments			X
27.	Lateral Placement and Stopping Distance		X	
28.	A Variance Analysis of Asphaltic Concrete (Report and Paper)	XX		
29.	Preformed Elastomeric Expansion Joints (Report and Paper)	XX		
30.	Corrosion Tests for Low Alloy Steels (Paper)	X		
31.	Intersection Design		X	
32.	Can Traffic Accidents be Reduced Significantly?		X	
32AA.	New Concepts in Highway Design		X	
33.	Two-Wire Emergency Call System			X
34.	Composite Pavement Route 3, Third Interim Bridge		X	
35.	Reflective Pavement Marker, Introductory Report		X	



NUMBER OF REPORTS ACCUMULATED
52
48
44
40
36
32
28
24
20
16
12
8
6
4
0
1966-1967
FISCAL
YEAR
22
1965-1966
FISCAL YEAR
13
1964-1965
FISCAL-YEAR
4
MONTH
7
9
11
3
5
7
9
11
3
5
7
9
11
3
5
7
1964
1965
1966

FIG-I

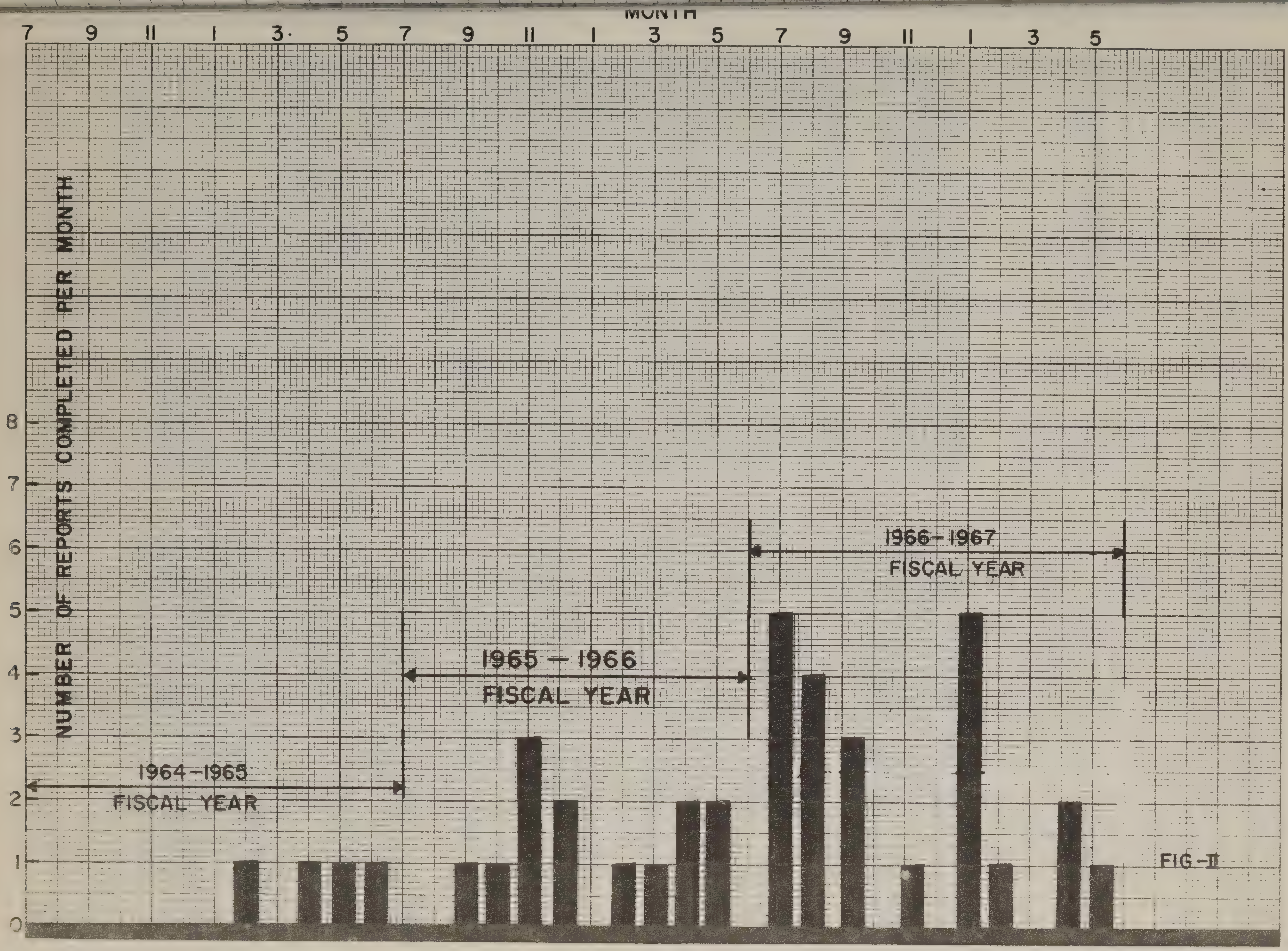

MONTH
7
9
11
1
3
5
7
9
11
1
3
5
7
9
11
1
3
5
NUMBER OF REPORTS COMPLETED PER MONTH
0
1
2
3
4
5
6
7
8
1964-1965
FISCAL YEAR
1965 — 1966
FISCAL YEAR
1966-1967
FISCAL YEAR

FIG-II

OUTSIDE CONTACTS

BESIDES THEIR MAIN ACTIVITIES WITHIN THE DEPARTMENT'S ORGANIZATION, MANY OF THE DIVISION'S MEMBERS HAVE COOPERATED WITH SCIENTIFIC AND TECHNICAL GROUPS.

NINE OF THEM WERE MEMBERS OF THE INSTITUTE OF TRAFFIC ENGINEERS, THREE OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS, AND TWO OF THE SOCIETY OF PROFESSIONAL ENGINEERS OF NEW JERSEY. EACH OF THE FOLLOWING GROUPS COMPRISED ONE OF OUR STAFF AMONG ITS MEMBERS: ASSOCIATION OF HIGHWAY OFFICIALS OF NORTH ATLANTIC STATES; ENGINEERS CLUB OF TRENTON; AMERICAN INSTITUTE OF MANAGEMENT; NEW JERSEY SOCIETY OF MUNICIPAL ENGINEERS; PENNSYLVANIA SOCIETY OF PROFESSIONAL ENGINEERS; AMERICAN SOCIETY OF ENGINEERING EDUCATION; INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS; AND OPERATIONS RESEARCH SOCIETY OF AMERICA. THESE MEMBERSHIPS ADD UP TO A TOTAL OF 23. THREE OF THE DIVISION'S ENGINEERS ARE LICENSED PROFESSIONAL ENGINEERS OF THE STATE OF NEW JERSEY.

IN ADDITION, THE NJDT WAS REPRESENTED BY 27 OF ITS RESEARCH MEN ON 22 SCIENTIFIC AND TECHNICAL COMMITTEES: 12 OF THE HRB (HIGHWAY RESEARCH BOARD), 5 OF THE ITE (INSTITUTE OF TRAFFIC ENGINEERS), 2 OF THE IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS), 2 OF THE NCHRP (NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM), AND 1 OF THE ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS). THE EXTENT OF THIS TECHNICAL COVERAGE IS DETAILED IN TABLE II.

TWENTY HIGHLY DIVERSIFIED PROFESSIONAL MEETINGS WERE ATTENDED OUTSIDE OF NEW JERSEY DURING THE FISCAL YEAR AS SHOWN IN TABLE III. TWELVE PAPERS WERE GIVEN OR SUBMITTED FOR PRESENTATION AT MEETINGS OF THE HRB AND THE ITE.

FOUR ARTICILES WERE PUBLISHED IN MAGAZINES. IN TRAFFIC ENGINEERING: "ACCIDENT RATES AND CONTROL OF ACCESS", AND "LOW LEVEL BRIDGE LIGHTING", BY D. W. GWYNN, AND "MILEPOST SYSTEM FOR NEW JERSEY HIGHWAYS", BY W. T. BAKER. IN TRAFFIC QUARTERLY: "RELATIONSHIP OF ACCIDENT RATES AND ACCIDENT INVOLVEMENTS WITH HOURLY VOLUMES", BY D. W. GWYNN.

A NUMBER OF LECTURES WERE GIVEN TO THE SENIOR CIVIL ENGINEERING CLASS AT RUTGERS UNIVERSITY:

> JANUARY 1967, BY E. F. REILLY AND W. T. BAKER ON "HIGHWAY SAFETY STANDARDS";
>
> APRIL 1967, BY W. R. BELLIS ON "NEW CONCEPTS IN HIGHWAY DESIGN";
>
> APRIL 1967, BY J. T. DEMPSTER, JR. ON "STUDDED TIRES".

FURTHERMORE, D. W. GWYNN SPOKE IN MARCH AT WEST VIRGINIA UNIVERSITY ON "TRANSPORTATION RESEARCH IN NEW JERSEY", AND TO THE PLAINSBORO LIONS CLUB ON "HIGHWAY SAFETY IN NEW JERSEY". MR. GWYNN IS A VISITING LECTURER IN CIVIL ENGINEERING AT RUTGERS UNIVERSITY.

TABLE II

NUMBERS OF MEMBERS IN COMMITTEES

		S.M.	S.T.	E.S.	D.
12	**Highway Research Board:**				
	Highway Capacity				1
	Adhesives, Bonding Agents and Their Uses			1	
	Characteristics of Traffic Flow		1		
	Electronic Research in the Highway Field			1	
	Field Testing of Bridges	1			
	Highway Safety		2		
	Illumination and Visibility			1	
	Maintenance of Bituminous Pavements	1			
	Metals and Highway Structures	1			
	Operational Effects of Geometrics		1		1
	Quality of Traffic Service		1		
	Surface Properties—Vehicle Interaction	1			
	Vehicle Characteristics		2		
		4	7	3	2
5	**Institute of Traffic Engineers:**				
	Delineation of Exit and Entrance Ramps		2		
	Part-Time Traffic Control Devices		1		
	Philosophy of Signs		3		
	Significance of Colored Pavements		1		
	Yield Signs		1		
			8		
2	**Institute of Electrical and Electronic Engineers:**				
	Audio and Electrical Acoustics			1	
	Vehicular Communications			1	
				2	
2	**National Cooperative Highway Research Program:**				
	Two Advisory Committees			1	1
				1	1
1	**American Society for Testing and Materials:**				
	Road and Paving Materials (2 task groups)	1			
		1			
22	29	5	15	6	3

TABLE III

PROFESSIONAL MEETINGS

1966		S.M.	S.T.	E.S.	D.
Sept.	ITE, NY Metropolitan Section, NYC		3		
Oct.	ITE, Annual, Cincinnati, Ohio		1		1
Nov.	ITE, NY Met. Section, NYC		3		
Dec.	ITE, NY Met. Section, NYC		3		
1967					
Jan.	ITE, NY Met. Section, NYC		3		
	HRB, Annual, Washington, D.C.	3	5	2	2
Feb.	ITE, NY Met. Section, NYC		3		
	N.C.H.R.P., Washington, D.C.			1	1
	NJ Highway Users Conference, Newark		1		1
Mar.	ITE, NY Met. Section, NYC		3		
	ASCE/ITE, Philadelphia, Pa.		2		
	NJ Asphalt Paving Assoc., Annual,Atlantic City	1			
	IEEE Convention, NYC			1	
Apr.	ITE, NY Met. Section, NYC		3		
	AHONAS, Annual, Baltimore, Md.				1
May	ITE, NY Met. Section, NYC		3		
	NJ Asphalt Paving Assoc., Materials Conf., Rutgers	2			
	Operations Research Soc. of America, Annual, NYC				1
June	N.C.H.R.P., Washington, D.C.			1	1
	ASTM, Annual, Boston, Mass.	1			
20 Meetings — Total Attendance 53		7	33	5	8

ESTABLISHMENT

PERSONNEL

THE PERSONNEL-MANNING LEVEL OF THE DIVISION FLUCTUATED DURING THE FISCAL YEAR FROM 42 TO 51 PERMANENT PERSONNEL, AUGMENTED DURING THE SUMMER MONTHS BY SEASONAL ASSISTANTS (STUDENTS ON SUMMER VACATION) AVERAGING 34 SUCH EMPLOYEES.

THE ASSIGNED PERMANENT PERSONNEL CONSISTED OF RESEARCH ENGINEERS, TECHNICIANS AND CLERICAL PERSONNEL ON THE FOLLOWING LEVELS:

PROFESSIONAL PERSONNEL — 55%
TECHNICIANS — 25%
CLERICAL — 20%

FOR DETAILS, SEE FIGURES III, IV, V, VI HEREAFTER.

THERE IS A TREMENDOUS DEMAND TODAY FOR ENGINEERS AND RESEARCH PERSONNEL. ESPECIALLY THOSE WITH GRADUATE DEGREES AND THE NECESSARY INTEREST AND PATIENCE TO PERFORM RESEARCH. COMPETITION BY PRIVATE INDUSTRY AND OTHER GOVERNMENTAL AGENCIES, USUALLY WITH HIGHER COMPENSATION AND FEWER CONSTRAINTS ON THE PROCUREMENT OF EQUIPMENT AND FACILITIES, ARE ONLY PART OF THE PROBLEM.

WHATEVER THE MOMENTARY CIRCUMSTANCES, WE HAVE TO FACE THE FACT THAT THIS DIVISION CANNOT ACCOMPLISH ITS KEY-MISSION WITHOUT A SUBSTANTIAL BUILD-UP OF ITS SPECIALIZED STAFF.

TO SOME EXTENT, RESEARCH IS EQUIPMENT, BUT ABOVE ALL IT IS PEOPLE. GOOD MEN CAN ACHIEVE MUCH, EVEN WITH LITTLE EQUIPMENT, BUT AMPLE EQUIPMENT OF THE HIGHEST QUALITY IS USELESS WITHOUT COMPETENT MEN.

THE ANSWERS TO SOME OF OUR MOST SERIOUS HIGHWAY PROBLEMS ARE IN MORE RESEARCH. THIS TAKES TIME, AND CARE, AND OPEN MINDS—THE TIME, CARE AND MINDS OF GOOD MEN.

DIVISION OF RESEARCH AND EVALUATION

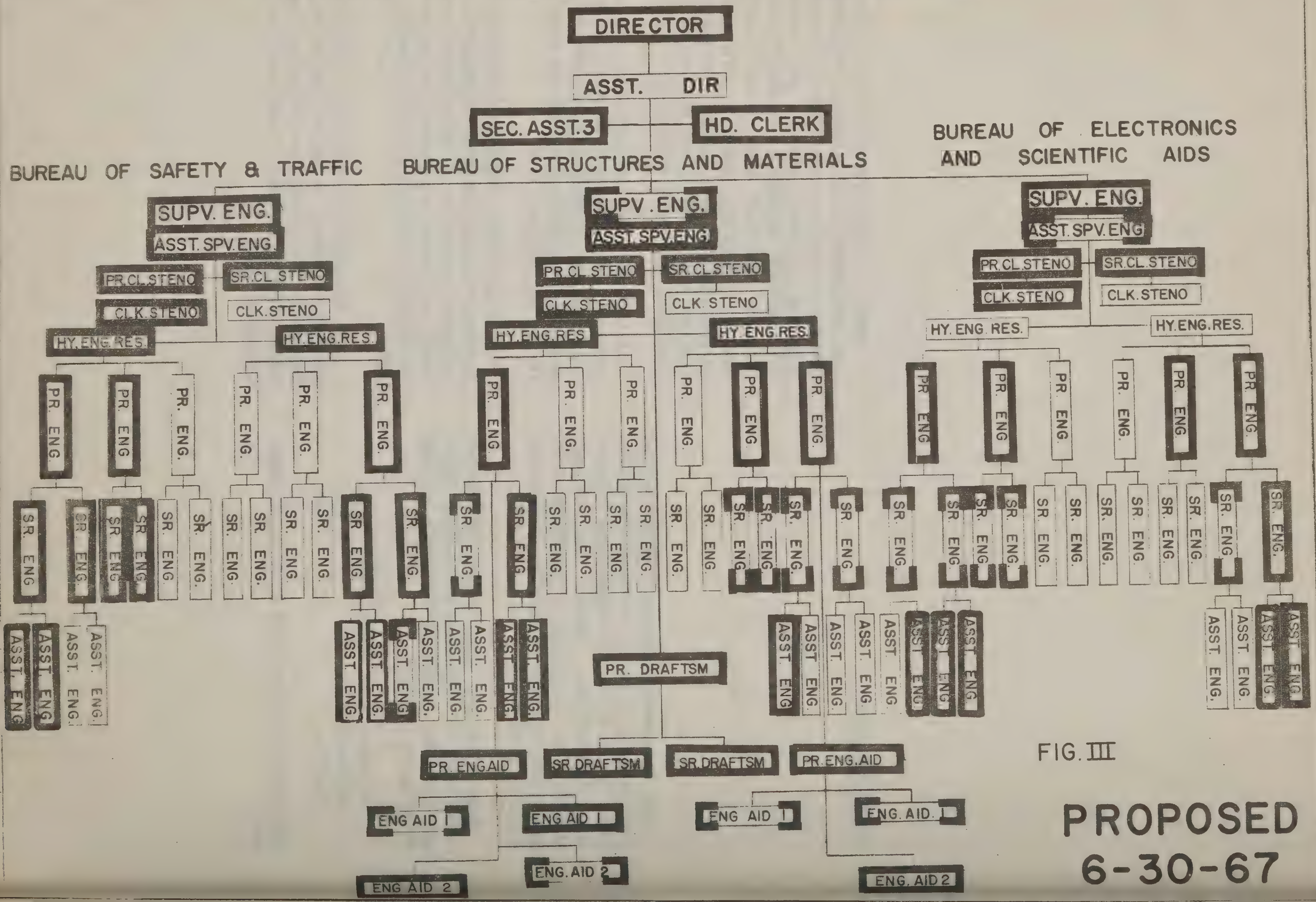


FIG. III

PROPOSED
6-30-67

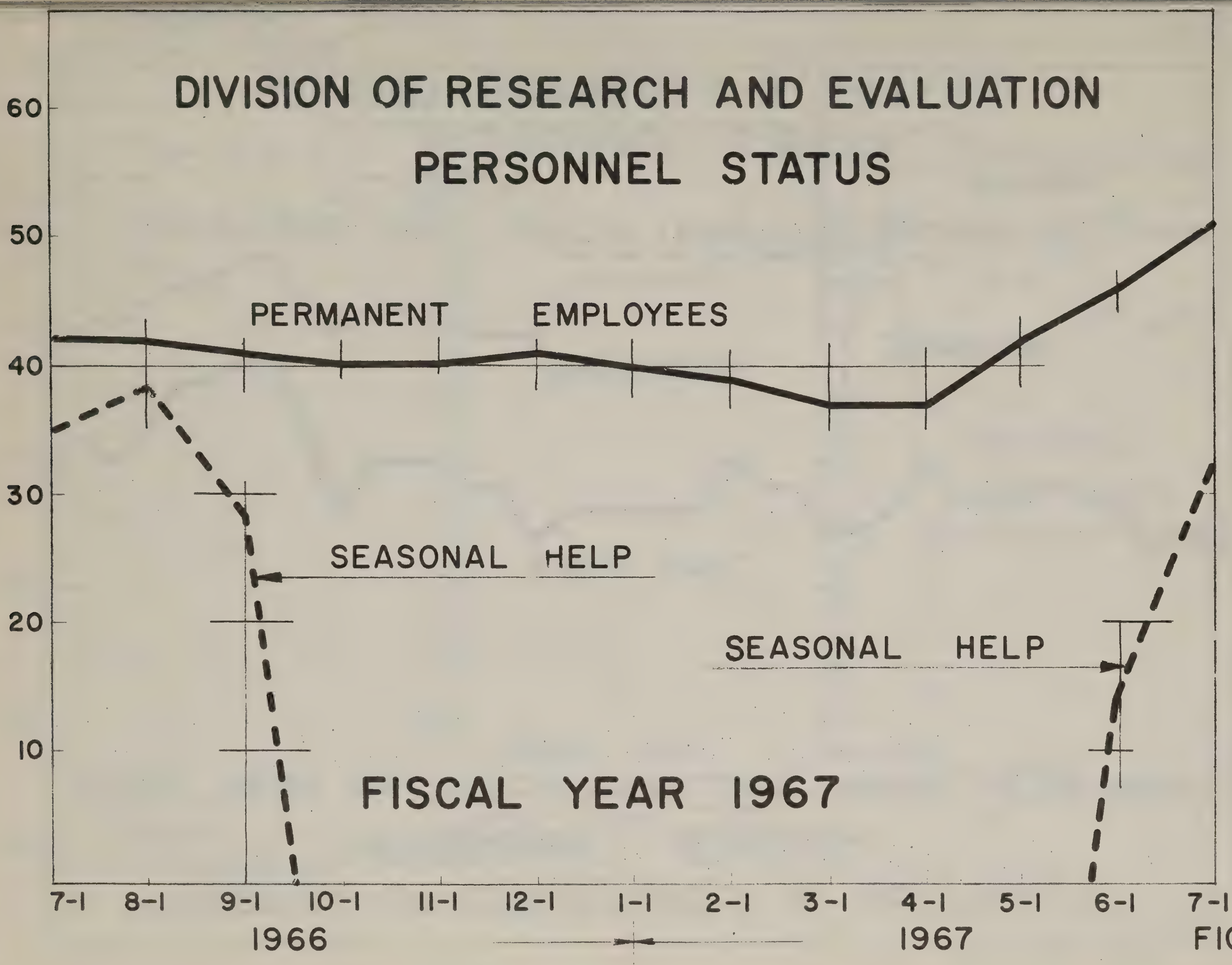
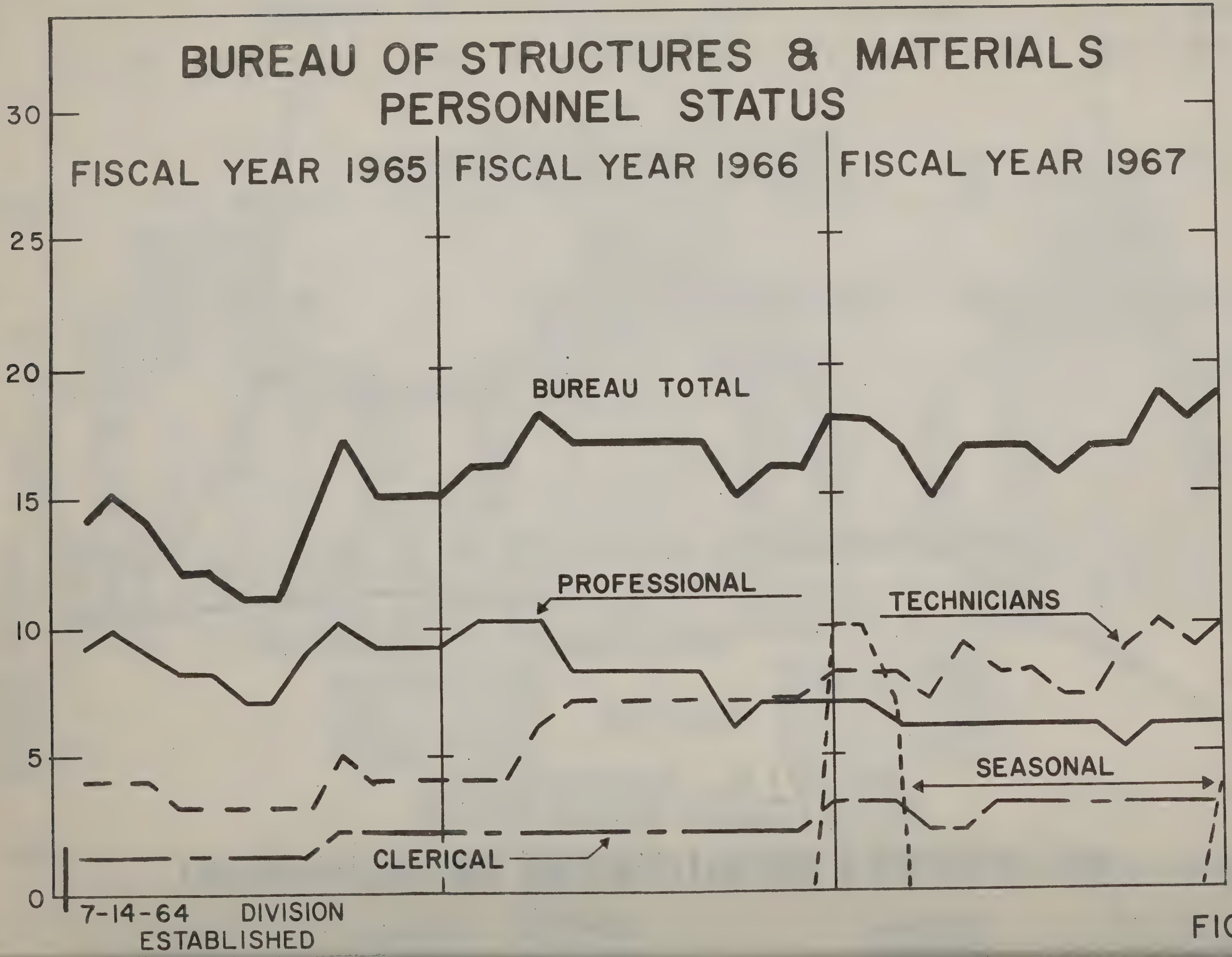

DIVISION OF RESEARCH AND EVALUATION
PERSONNEL STATUS
60
50
40
30
20
10
PERMANENT EMPLOYEES
SEASONAL HELP
SEASONAL HELP
FISCAL YEAR 1967
7-1
8-1
9-1
10-1
11-1
12-1
1-1
2-1
3-1
4-1
5-1
6-1
7-1
1966
1967

FIG. IV



BUREAU OF STRUCTURES & MATERIALS
PERSONNEL STATUS

FIG. V

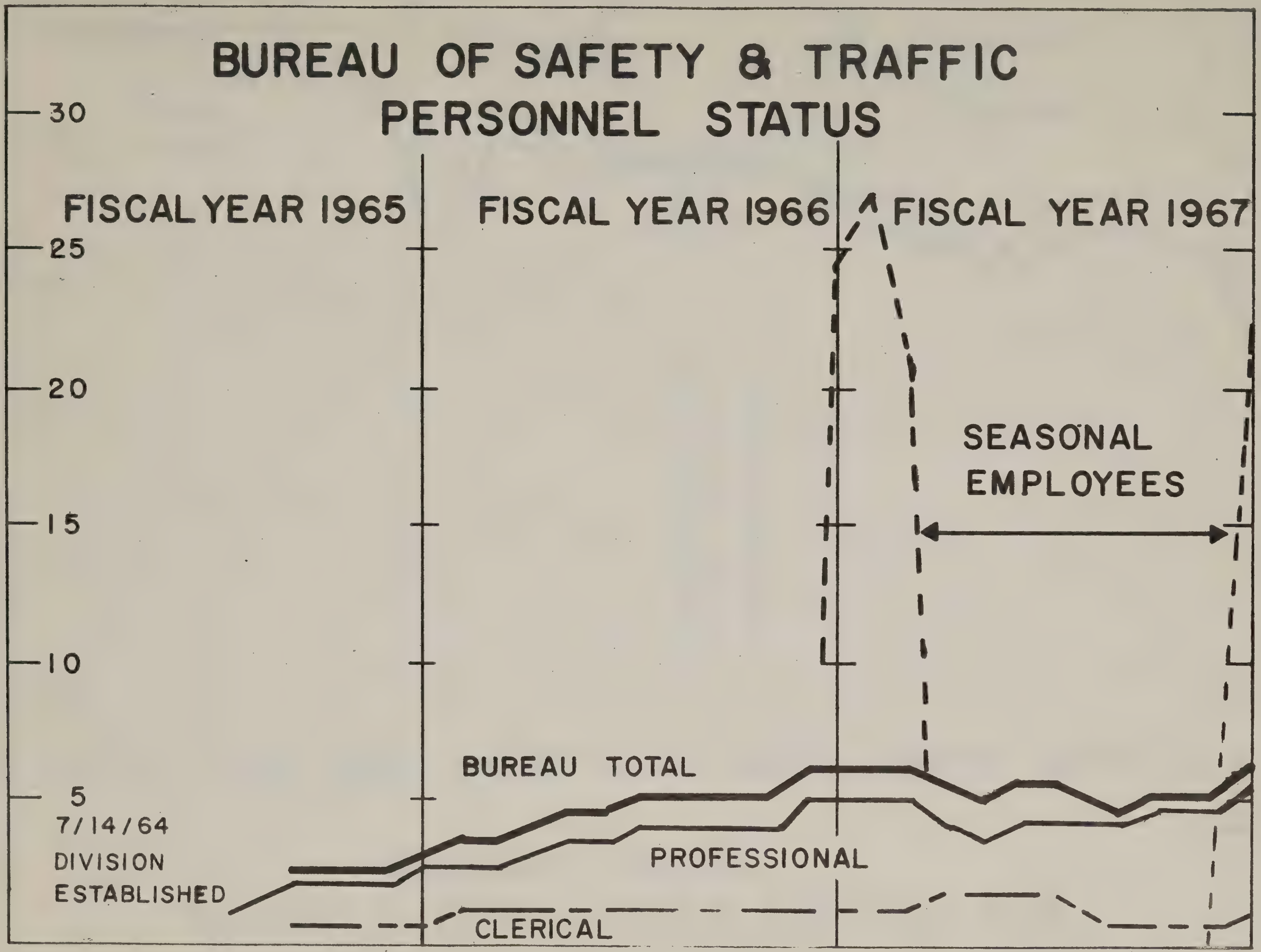

BUREAU OF SAFETY & TRAFFIC
PERSONNEL STATUS
30
25
20
15
10
5
FISCAL YEAR 1965
FISCAL YEAR 1966
FISCAL YEAR 1967
SEASONAL
EMPLOYEES
BUREAU TOTAL
PROFESSIONAL
CLERICAL
7/14/64
DIVISION
ESTABLISHED

FIGURE VI

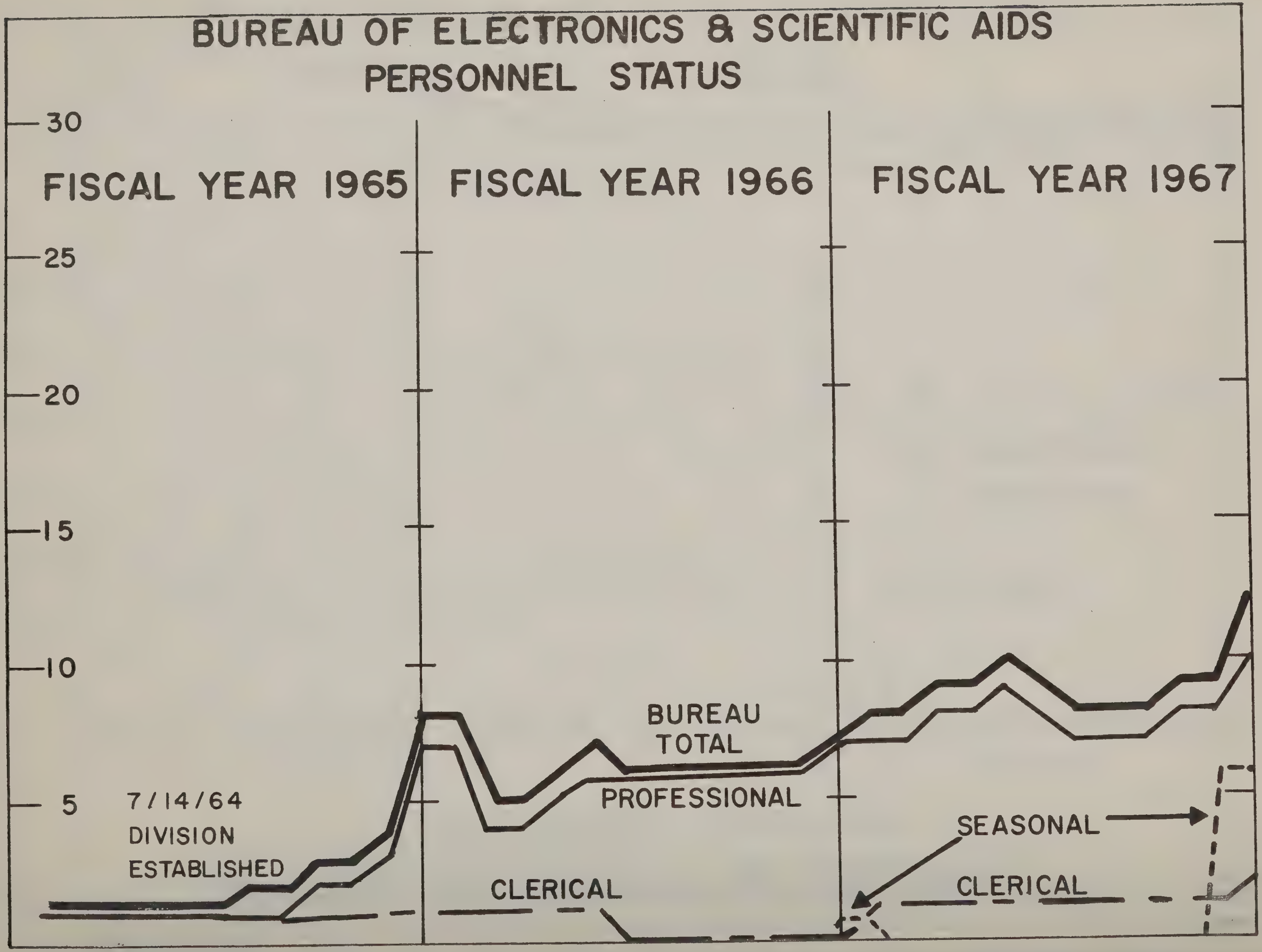

BUREAU OF ELECTRONICS & SCIENTIFIC AIDS
PERSONNEL STATUS
30
25
20
15
10
5
FISCAL YEAR 1965
FISCAL YEAR 1966
FISCAL YEAR 1967
7/14/64
DIVISION
ESTABLISHED
BUREAU
TOTAL
PROFESSIONAL
CLERICAL
SEASONAL
CLERICAL

FIGURE VII

BIOGRAPHIES

of professional personnel
appointed during fiscal year

JACK R. CROTEAU

Mr. Croteau attended Lehigh University where he received B.A. and B.S.C.E. degrees. He also holds a M.S.C.E. degree from Drexel Institute of Technology.

Prior to coming to the Division of Research in May 1967, Mr. Croteau worked for the Bureau of Maintenance.

Mr. Croteau received the Engineer-in-Training certificate from the State of Pennsylvania.

Jack R. Croteau

JOHN T. DEMPSTER, JR.

Mr. Dempster first joined the Division in August, 1964 in a temporary administrative title; in January, 1967 he was appointed an Assistant Engineer and is serving as the Administrative Assistant to the Director of Research, Transportation.

Mr. Dempster is a retired Navy Lieutenant Commander having served in various duty stations between January 1937, when he first enlisted, to June 1964 when he retired.

Mr. Dempster completed five terms of study at Miami University, Oxford, Ohio and 40 weeks at the Navy General Line School, Monterey, California, as well as other shorter courses.

ROGER FERVAL

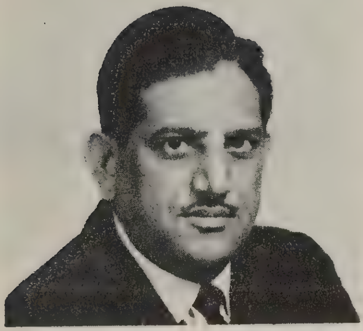
After his engineering studies at Lausanne, his career started in the French steel industry, which sent him to this country in 1927. At the end of two years in New York as the delegate of the de Wendel mills, he switched to American Business.

Johns-Manville moved him back to Paris as representative and sales engineer to travel in Eruope, involving him in many technologies. His country's disaster and the occupation of Paris early in the second World War forced him southward into the so-called Free Zone. There he taught English until finally securing the exit visa - just before the Allied landings in North Africa and Hitler's take-over of Southern France. In Hospitable Portugal he worked as consulting engineer on architectural acoustics, including research.

The War's end brought him back to New York and his old company, from which he resigned in 1957. He had become an American Citizen in 1952. Several exploratory jobs led to the managing editorship of the technical magazine IAMI (Iron Age Metalworking International, in four languages) and, in the spring of 1966, to the Bureau of Public Information of the New Jersey Department of Transportation.

He has been technical editor of the Division of Research and Evaluation since the fall of 1966, with the rank of Assistant Engineer.

Roger Ferval



MUNIREDDY V. JAGANNATH

Mr. Jagannath joined the Division in May 1967 as an Assistant Highway Engineer within the Bureau of Safety and Traffic.

Mr. Jagannath received his Bachelor's Degree in Civil Engineering from the University of Mysore in India in 1958. He was then employed in India as a Civil Engineer in a supervisory category on such projects as buildings and roads until August 1966. From September 14, 1966 until May 5, 1967 he was enrolled as a graduate student at West Virginia University. He completed the following courses: Highway Planning I, Traffic Engineering I, Urban-Geography, Traffic Operations II, and Geometric Design.

MJagannath

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Mr. Jagannath's second signature is done in Kannada or Canarese, the regional language of his native State of Mysore, in South-Central India.

ARTHUR C. JOHNSON

Mr. Johnson joined the New Jersey Department of Transportation as a Principal Engineer, Research, in the Bureau of Electronics and Scientific Aids in April 1967.

Prior to that time, he was employed as a superviser in the Electric Department, Central Maintenance Div., United Steel Corp., Fairless Works. He began his professional career there in June 1965 as a management trainee.

Mr. Johnson received a Bachelor of Science degree in Electrical Engineering from the University of New Hampshire in June 1965. He obtained an Associate Bachelor of Science degree in Electronics Engineering from Wentworth Institute of Technology in June 1959. He is presently doing graduate work in engineering science at the Pennsylvania State University, King of Prussia Graduate Center.

Mr. Johnson is a member of the Association of Iron and Steel Engineers and Pi Mu Delta fraternity, and holds a third class radio telephone license. He has been a member of the Institute of Radio Engineers, and was an active member of the Institute of Electronics and Electrical Engineers for seven years from 1959 to 1965.

Arthur C. Johnson

MARY T. KONDASH

Miss Kondash joined the staff of the Division of Research and Evaluation of the New Jersey Department of Transportation in June, 1967, as an Assistant Engineer for the Bureau of Electronics and Scientific Aids.

Since she is a 1967 college graduate, her professional contributions at this time are limited. However, she has worked on Pavement Heating for her Bureau and is presently learning computer programming.

Miss Kondash is a graduate of Rutgers - College of South Jersey with a B.A. degree in mathematics and is a member of Pi Mu Epsilon, a national honorary mathematics society. Presently, she is attending Drexel Institute of Technology working toward a M.S. degree in mathematics.

Mary T. Kondash

JERRY KRAFT

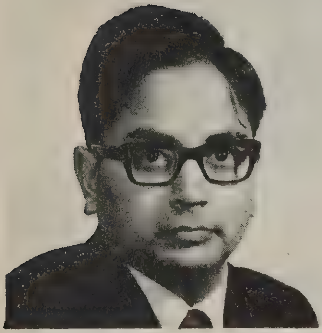
Mr. Kraft joined the Division in February 1965 as an Assistant Engineer; in August 1967 he was promoted to a Principal Engineer within the Bureau of Safety and Traffic.

Mr. Kraft was born in Israel and there graduated from high school. He served in the Israeli Air Force for two years and then came to the United States in 1960 and entered City College in New York in 1960. In 1965 he graduated with a B.S. degree in mathematics.

In August 1966 Mr. Kraft obtained a leave of absence from the Division and entered West Virginia University as a Graduate Research Assistant. After receiving an M.S.E. degree in Transportation Engineering, Mr. Kraft returned to the Division.

Jerry Kraft
אלי קרפט

Mr. Kraft's second signature is done in his native Hebrew.



PRAFULL C. PATEL

Mr. Patel received his Bachelor Degree in Electrical Engineering from L. D. College of Engineering of Gujarat University, Ahmedabad, India in 1965. After graduation he worked as Assistant Engineer for Public Works Department of Gujarat State India, till July 1966. The duty on the job was to supervise and maintain government electrical installation.

Mr. Patel has taken courses in Electrical Engineering at Stevens Institute of Technology, Hoboken, N.J. and Newark College of Engineering, Newark, N.J., which will lead him to a Master's Degree in Electrical Engineering.

He joined the staff of the Division of Research and Evaluation in June 1967 as an Assistant Engineer in the Bureau of Electronics and Scientific Aids.

pcpatel

પ્ર. ચ. પટેલ

Mr. Patel's second signature is done in Gujarati, the regional language of his native State of Gujarat, in North-West India.

RICHARD RAHMAN

Mr. Rahman joined the Department of Transportation in March 1967.

Previously, he worked as a plastics specialist with the Boeing-Vertol Company; as market development/sales engineer for the Celanese Plastics Company; in marketing and sales for the Hercules Powder Company and as Assistant Traffic Engineer for the Delaware State Highway Department.

Mr. Rahman received his B.S.M.E. from the Pennsylvania Military College in 1960. He is currently working towards his M.B.A. (operations research) and L.L.B.

R. Rahman

FRANK WINTERS

Mr. Winters joined the Division of Research and Evaluation in November 1966 as an Assistant Engineer in the Bureau of Electronics and Scientific Aids.

Mr. Winters is presently involved in the design of experimental heated pavement systems for installation in Highway Sytems.

Mr. Winters graduated from Villanova University in June 1965 with a B. S. in Physics. He attended Oregon State University during the 1965-1966 school year participating in graduate studies in Physics, and is currently pursuing a Master's Degree in Radiation Science through graduate studies at Rutgers-The State University on a part-time basis.

Frank Winters

FACILITIES

EAST STATE STREET

DURING MOST OF THE FISCAL YEAR THE OFFICE OF THE DIRECTOR OF THE DIVISION AND THE SUPERVISING ENGINEERS OF THE THREE BUREAUS WAS LOCATED AT 12 FARRELL AVENUE IN THE VICINITY OF THE MAIN HIGHWAY BUILDING. ITS AREA OF MORE THAN 5000 SQUARE FEET PROVIDED OFFICE, LIBRARY AND CONFERENCE FACILITIES.

ON MAY 22, 1967 THE DIVISION'S HEADQUARTERS MOVED TO THE ARNOLD CONSTABLE BUILDING AT 209 EAST STATE STREET. THIS NEW TEMPORARY LOCATION ACCOMMODATES THE SAME FUNCTIONS IN A TOTAL SPACE OF 4400 SQUARE FEET.

INMAN AVENUE, RAHWAY

A SMALL COMBINED OFFICE AND LABORATORY BUILDING (SOME 1400 SQUARE FEET) LOCATED IN RAHWAY, PROVIDES FACILITIES FOR THE ENGINEERS WHO ARE PRIMARILY ENGAGED IN TRAFFIC STUDIES IN NORTHERN NEW JERSEY. IT ALSO SERVES OTHER RESEARCH PROJECTS WHICH CAN BE MORE SUITABLY UNDERTAKEN AT THIS LOCATION.

MERCER COUNTY AIRPORT

THE SMALL AREA (900 SQUARE FEET) PREVIOUSLY ACQUIRED IN A BUILDING AT MERCER COUNTY AIRPORT, TO SERVE AS AN ENVIRONMENTAL "FOG CHAMBER" FOR TESTING AND DEMONSTRATIONS OF THE "FOG BROOM," WAS EXPANDED ON OCTOBER 1, 1966 TO OVER 2000 SQUARE FEET, GIVING THE BUREAU OF ELECTRONICS AND SCIENTIFIC AIDS ADDITIONAL LABORATORY, OFFICE AND STORAGE FACILITIES.

FERNWOOD

THE BUREAU OF STRUCTURES AND MATERIALS USES A 700 SQUARE FEET SHACK IN THE MAINTENANCE COMPLEX AS WORKSHOP AND STORAGE ROOM FOR ITS FIELD CREWS.

THE FUTURE

DURING THE FISCAL YEAR, PRELIMINARY STUDIES WERE UNDERTAKEN TO DEFINE THE ELEMENTS OF AN EXPANDED, MODERN CENTER OF RESEARCH AND TESTING, AND PAVE THE WAY FOR MORE DETAILED PLANNING.

LIBRARY

ALTHOUGH OUR BIBLIOGRAPHICAL COLLECTION IS STILL LIMITED, IT HAS ALREADY PROVED ITS USEFULNESS IN OUR MANY SEARCHES.

AT THIS STAGE OF OUR EXPANSION THE INVENTORY OF THE LIBRARY OF THIS DIVISION HAS REACHED A COUNT OF SOME 150 BOOKS AND 2000 BROCHURES AND MAGAZINES.

DURING THE PAST FISCAL YEAR A MONTHLY AVERAGE OF ONE BOOK AND ELEVEN PUBLICATIONS OF THE HIGHWAY RESEARCH BOARD WERE ADDED TO OUR SHELVES. THE 30 PERIODICALS TO WHICH WE SUBSCRIBE ARRIVED AT THE RATE OF 9 PER MONTH.

WHILE THE RESEARCH LIBRARY IS A SPECIALIZED OVERFLOW OF THE DEPARTMENT'S GENERAL LIBRARY, SOME OF THE BOOKS MADE AVAILABLE BY THE LATTER WERE ACQUIRED AT THIS DIVISION'S REQUEST. RECIPROCALLY THE DIVISION'S BOOKS ARE AVAILABLE THROUGHOUT THE DEPARTMENT AND MONTHLY LISTS OF ACQUISITIONS ARE CIRCULARIZED AMONG THE OTHER DIVISIONS.

DORE

REPORTS OF THE THREE BUREAUS:

STRUCTURES AND MATERIALS
SAFETY AND TRAFFIC
ELECTRONICS & SCIENTIFIC AIDS

BUREAU OF STRUCTURES AND MATERIALS

FUNCTIONS

THE MISSION OF THE BUREAU OF STRUCTURES AND MATERIALS IS TO PERFORM SCIENTIFIC RESEARCH AND EVALUATION PERTAINING ESSENTIALLY TO HIGHWAY STRUCTURES AND HIGHWAY MATERIALS, AS WELL AS METHODS OF CONSTRUCTION AND MAINTENANCE.

ITS PRINCIPAL GOAL IS TO IMPROVE HIGHWAY CONSTRUCTION, MATERIALS, AND PRACTICES IN ORDER TO PROVIDE BETTER HIGHWAYS AND REDUCE THE NUMBERS OF FATALITIES, INJURIES AND ACCIDENTS; ALSO KEEPING CONVENIENCE AND COMFORT IN MIND, AS WELL AS THE OVERALL ECONOMIC PICTURE. ITS FUNCTIONS ALSO INCLUDE THE EVALUATION OF PAVEMENTS AND STRUCTURES TO INVESTIGATE SUBSTANDARD PERFORMANCE AND TO RECOMMEND ADEQUATE REHABILITATION.

THE BUREAU MAINTAINS LIAISON WITH THE HIGHWAY RESEARCH BOARD, THE AMERICAN SOCIETY FOR TESTING AND MATERIALS, THE BUREAU OF PUBLIC ROADS, RESEARCH FOUNDATIONS, UNIVERSITIES AND INDUSTRY, ON MATTERS PERTAINING TO ITS MISSION AND FUNCTIONS.

ACCOMPLISHMENTS

SKID RESISTANCE

PERFORMANCE STARTED ON A CONTRACT MADE BEFORE THE START OF THE YEAR WITH STEVENS INSTITUTE OF TECHNOLOGY TO DEVELOP AN APPROPRIATE FIELD SKID-TESTING DEVICE AND TO MEASURE THE SKID RESISTANCE OF VARIOUS PAVEMENT TYPES AT A LARGE NUMBER OF SELECTED LOCATIONS. THIS STUDY SHOULD INCREASE OUR KNOWLEDGE OF PAVEMENT SURFACE CHARACTERISTICS AND MAY LEAD TO A CONTINUING PROGRAM OF EVALUATION OF THE SKID PROPERTIES OF SPECIFIC LOCATIONS AND TO THEIR IMPROVEMENT WHERE NECESSARY. THIS TRAILER IS CURRENTLY IN THE PROCESS OF BEING PROOF-TESTED.

STATISTICAL CORRELATION AND VARIANCE ANALYSIS

THIS STUDY ANALYZES STATISTICALLY: (A) THE VARIANCE IN TESTS OF STRUCTURAL CONCRETE CYLINDERS; (B) THE CORRELATION BETWEEN MIXTURE TESTS AND PAVEMENT TESTS FOR BITUMINOUS PAVEMENTS; AND (C) THE

VARIANCE IN SAMPLING, TESTING, AND MATERIALS OR OPERATIONS FOR BITUMINOUS PAVEMENTS. THE INFORMATION THUS OBTAINED WILL BE USED TO ESTABLISH THE VALIDITY OF TESTING RESULTS AND TO CONTRIBUTE TO THE ESTABLISHMENT OF A DEPARMENTAL QUALITY CONTROL PROGRAM WITH A STATISTICAL FOUNDATION. A PAPER ON THIS SUBJECT WAS PRESENTED AT THE 1967 ANNUAL MEETING OF THE HIGHWAY RESEARCH BOARD. THE FULL REPORT IS NEARING COMPLETION.

PREFORMED ELASTOMERIC JOINT SEALERS

THE CHARACTERISTICS AND PERFORMANCE OF PREFORMED ELASTOMERIC MATERIALS, CURRENTLY ACCEPTED FOR USE ON BRIDGES, IS INVESTIGATED. THE IMPROPER SEALING OF BRIDGE AND HIGHWAY JOINTS MAY CAUSE CONSIDERABLE DAMAGE NECESSITATING COSTLY REPAIRS. THE SUBJECT SEALER IS A RELATIVELY NEW APPLICATION WITH CONSIDERABLE POSSIBILITIES FOR WHICH, HOWEVER, MATERIAL AND DESIGN LIMITATIONS HAVE NOT BEEN ADEQUATELY ESTABLISHED. A PAPER ABOUT IT WAS PRESENTED AT THE 1967 ANNUAL MEETING OF THE HIGHWAY RESEARCH BOARD, AND A COMPLETE REPORT WITH RECOMMENDATIONS WAS ISSUED.

ANTI-SCALING AGENTS

THREE SUCH PRODUCTS WERE UTILIZED ON CONCRETE SURFACES IN THE CONSTRUCTION OF AN EXPERIMENTAL BRIDGE DECK WHICH IS CURRENTLY UNDER EVALUATION. AN INTERIM REPORT ON THE PROJECT IS BEING PREPARED. THE SCALING OF CONCRETE SURFACES—A SERIOUS PROBLEM IN MANY STATES INCLUDING NEW JERSEY—IS USUALLY FOLLOWED BY MORE SERIOUS DETERIORATION. THE USE OF DE-ICING AGENTS AGGRAVATES THIS PHENOMENON. A DURABLE LOW COST PROTECTIVE MATERIAL WILL INCREASE THE SERVICE LIVES OF STRUCTURES.

BRIDGE CONSTRUCTION OF UNPAINTED ASTM A-242 STEEL

THIS IS AN APPRAISAL OF THE PERFORMANCE OF UNPAINTED STEEL BRIDGE CONSTRUCTION TO DETERMINE ITS POTENTIAL OF MINIMIZING MAINTENANCE REQUIREMENTS WITHOUT SEVERE DEPRECIATION OF APPEARANCE. MAINTENANCE OF STRUCTURES AND TRAFFIC INCONVENIENCES WILL BE MINIMIZED IF THIS MATERIAL CAN BE SATISFACTORILY USED. A PAPER WAS PRESENTED AT THE 1967 ANNUAL MEETING OF THE HIGHWAY RESEARCH BOARD; A REPORT CONCERNED WITH THE GENERAL SUBJECT AND WITH THE MONITORING OF AN EXPERIMENTAL BRIDGE NOW UNDER CONSTRUCTION IS IN THE PROCESS OF BEING PREPARED.

RUMBLE STRIPS

A MATERIALS AND APPLICATION STUDY OF VARIOUS METHODS TO INTRODUCE AN AUDIBLE AND VIBRATORY EFFECT INTO A PAVEMENT TO WARN MOTORISTS APPROACHING A POTENTIALLY HAZARDOUS SITUATION, SUCH AS A TRAFFIC CIRCLE, TRAFFIC SIGNAL, ETC. OBTAINED FAVORABLE COMMENTS FROM NEW JERSEY STATE POLICE REGARDING THE STRIPS INSTALLED AT THE RED LION CIRCLE (ROUTE U.S. 206 AT ROUTE 70) SHOWN IN FRONT PICTURE.

STUDDED TIRES

AN ASSESSMENT OF THE RELATIVE EFFECTS ON PAVEMENTS THAT CAN BE ANTICIPATED BY THE USE OF STUDDED TIRES. A PAPER WAS PRESENTED AT THE ANNUAL MEETING OF THE HIGHWAY RESEARCH BOARD. A REPORT WITH APPROPRIATE RECOMMENDATIONS WAS ALSO PREPARED.

DOLOMITE AGGREGATES

AN INVESTIGATION OF THE RELATIVE SKID RESISTANCE OF BITUMINOUS SURFACES CON-

TAINING DOLOMITE AS THE COARSE AGGREGATE. THIS PROJECT WAS INITIATED AT THE REQUEST OF THE STATE HIGHWAY ENGINEER. THE PRESENT USE OF SAID AGGREGATE IS SUSPECTED OF ULTIMATELY PRODUCING A ROAD SURFACE WITH LESS SKID RESISTANCE THAN THAT PRODUCED WITH OTHER AGGREGATE TYPES. THE DETERMINATION OF THE FACTS IN THIS MATTER MAY SIGNIFICANTLY AFFECT FLEXIBLE PAVEMENT CONSTRUCTION, PARTICULARLY IN THE SOUTHERN PORTION OF NEW JERSEY. THE REPORT ON THIS STUDY HAD BEEN COMPLETED AFTER THE END OF FISCAL '67.

COLORED PAVEMENTS

AN EVALUATION OF THE PERFORMANCE OF MATERIALS AVAILABLE TO PRODUCE A COLORED SURFACE. THE USE OF COLORED MATERIALS ON HIGHWAYS MAY PROVIDE INCREASED SAFETY BY MORE EFFECTIVE COMMUNICATIONS TO THE TRAVELING PUBLIC. THE DEVELOPMENT OF SUITABLE MATERIALS FOR THIS USE IS PRESENTLY IN A PRELIMINARY STAGE. AN EXPERIMENTAL INSTALLATION OF A PARTICULAR TYPE OF MATERIAL WAS MADE AND IS UNDER SURVEILLANCE. SEE FRONT PICTURE.

EXPERIMENTAL PAVEMENT

THE RELATIVE PERFORMANCE OF THE VARIOUS TYPES OF BASE COURSE MATERIALS COMMONLY USED IN NEW JERSEY IS BEING APPRAISED IN THE EXPERIMENTAL SECTIONS CONSTRUCTED ON ROUTE I-80, SECTION 5V AND ROUTE I-95, SECTION 1R. ITS RESULTS SHOULD IMPROVE THE FUTURE DESIGNING OF FLEXIBLE PAVEMENTS IN NEW JERSEY. THE BENKELMAN BEAM USED ON THIS PROJECT IS SHOWN ON ONE OF THE FRONT PICTURES, MADE ON ANOTHER JOB.

PAVEMENT RIDING QUALITY

TO EVALUATE AND IMPROVE UPON THE RIDING QUALITIES OF PORTLAND CEMENT AND BITUMINOUS CONCRETE PAVEMENT TYPES, INCLUDING BRIDGE DECKS, IS THE SUBJECT OF THIS STUDY. PREVIOUS RESEARCH BY OTHERS INDICATES THAT SUCH IMPROVEMENTS SHOULD INCREASE THE USEFUL LIFE OF PAVEMENTS. A DETAILED WORK PLAN WAS SUBMITTED TO THE BUREAU OF PUBLIC ROADS FOR APPROVAL. A ROUGHOMETER (A DEVICE USED TO MEASURE RIDING QUALITY) WAS PURCHASED AND DELIVERED EARLY IN FISCAL YEAR '68; IT IS SHOWN IN ONE OF THE FRONT PICTURES.

COMPOSITE PAVEMENT

THE PERFORMANCE OF COMPOSITE PAVEMENTS SUBJECTED TO A LARGE VOLUME OF HEAVY TRUCK TRAFFIC IS EXAMINED WITH PARTICULAR REGARD TO SURFACE CONTINUITY. THIS IS A SERIAL PROJECT AND REPORTS ARE MADE ANNUALLY. THIS TYPE OF PAVEMENT CONSTRUCTIONS HAS CONSIDERABLE POTENTIAL TO SELECTIVELY IMPROVE PAVEMENT PERFORMANCE.

PORTLAND CEMENT CONCRETE PAVEMENT DESIGN

A COMPREHENSIVE EVALUATION OF THE CURRENT STANDARD PORTLAND CONCRETE PAVEMENT DESIGN USED IN NEW JERSEY WAS CONTINUED. THIS WORK, IN CONJUNCTION WITH A THOROUGH STUDY OF CURRENT DESIGN PRACTICES, COULD LEAD TO AN IMPROVED PAVEMENT DESIGN FOR NEW JERSEY. DESIGNS WARRANTING EXPERIMENTAL CONSIDERATION WERE SUBMITTED.

ROUTE 3 BRIDGE

THIS BRIDGE HAS HOLLOW FOUNDATIONS OVER A DEEP UNSTABLE MEDIUM. MOVEMENTS OF CONSIDERABLE MAGNITUDE HAD BEEN OBSERVED AND OUR SERVICES WERE REQUESTED BY ANOTHER BUREAU. IMMEDIATE CORRECTIVE MEASURES WERE RECOMMENDED AND ACCOMPLISHED. A CONTINU-

ING SURVEILLANCE OF THIS STRUCTURE WILL BE NECESSARY TO ENSURE PUBLIC SAFETY.

LATERAL PRESSURES ON STEEL FRICTION PILES

STEEL FRICTION PILES DRIVEN THROUGH A DEEP CLAY MEDIUM AND FOUNDED IN A LAYER OF SAND WERE INVESTIGATED. THE DESIGN INFORMATION TO BE DERIVED FROM THEIR DETECTED PERFORMANCE SHOULD PROVE USEFUL IN FUTURE FOUNDATION DESIGNS. THIS PROJECT IS BEING ADMINISTERED BY THE DIVISION OF DESIGN AND WILL BE A PART OF THE CONSTRUCTION AND DESIGN CONTRACT.

CONCRETE PAVEMENT DAMAGE

A STUDY OF PAVEMENT DAMAGE ATTRIBUTED TO THERMAL EFFECTS AND THE PRESENCE OF INCOMPRESSIBLE MATERIALS IN PAVEMENT JOINTS, COMMONLY REFERRED TO AS A "BLOW-UP". IT RESULTS IN VEHICULAR DELAYS, INCREASED MAINTENANCE COSTS, AND IMPAIRED PAVEMENT RIDING QUALITY.

BRIDGE METALLIC GRID DECKS

AN EVALUATION OF THE SAFETY CHARACTERISTICS, EMPHASIZING SKID-RESISTANCE, OF THE VARIOUS TYPES OF BRIDGE METALLIC GRID DECKS IN PLACE IN NEW JERSEY. DATA WERE COLLECTED AND A REPORT IS BEING PREPARED.

INLET GRATINGS AND MANHOLE COVERS

THIS REVIEW OF THE CURRENT DEPARTMENTAL PRACTICE OF SPECIFYING CAST INLET GRATINGS AND MANHOLE COVERS WAS INITIATED AT THE REQUEST OF THE STATE HIGHWAY ENGINEER. DECREASED INITIAL AND MAINTENANCE COSTS, AND GREATER EFFICIENCY IN THE HANDLING OF SURFACE DRAINAGE MAY BE ACHIEVED BY THE USE OF OTHER CURRENTLY AVAILABLE FORMS OF INLET GRATINGS AND MANHOLE COVERS. PROTOTYPE STEEL GRATINGS AND FRAMES HAVE BEEN RECEIVED FOR EVALUATION PURPOSES.

BRIDGE SETTLEMENT EVALUATIONS

AN EVALUATION OF THE SETTLEMENT OF THE ROUTE 71 BRIDGE OVER DEAL LAKE WAS INITIATED AND CONTINUED THROUGH AN INTRA-DEPARTMENTAL REQUEST. THE MONITORING OF THE STRUCTURAL MOVEMENTS ON THE SOUTH MARGINAL ROAD STRUCTURE OVER PARKWAY AVENUE (LINCOLN TUNNEL APPROACH COMPLEX) ALSO STARTED THROUGH AN INTRA-DEPARTMENTAL REQUEST.

PAVEMENT RECOMMENDATIONS

IN COLLABORATION WITH THE SOILS BUREAU, PAVEMENT DESIGNS WERE RECOMMENDED FOR 28 DESIGN PROJECTS. THE PAVEMENT DESIGNS WERE NOT ONLY ON MAIN-LINE ROADWAYS, BUT INCLUDED THE RAMPS, U-TURN FACILITIES, AND INCIDENTAL CONNECTING ROADS AS WELL. IN ADDITION, THIS WORK FREQUENTLY INVOLVED THE DEVELOPMENT OF SUITABLE MEANS FOR THE REHABILITATION OF DETERIORATED PAVEMENTS.

BUREAU OF SAFETY AND TRAFFIC

FUNCTIONS

THE MISSION OF THE BUREAU OF SAFETY AND TRAFFIC IS TO PERFORM SCIENTIFIC RESEARCH AND EVALUATION PERTAINING ESSENTIALLY TO TRAFFIC SAFETY, AS WELL AS TRANSPORTATION OF PEOPLE AND COMMODITIES, AND SYSTEMS AND TECHNIQUES PERTAINING TO DESIGN AND OPERATION OF STATE HIGHWAYS.

ITS PRINCIPAL GOAL IS TO REDUCE THE NUMBER OF FATALITIES, INJURIES AND ACCIDENTS OCCURRING ON THE NEW JERSEY STATE HIGHWAYS, THEREBY MAKING OUR HIGHWAYS THE SAFEST, MOST CONVENIENT AND EFFICIENT SYSTEM OF HIGHWAYS POSSIBLE; ALSO KEEPING CONVENIENCE AND COMFORT IN MIND, AS WELL AS THE OVERALL ECONOMIC PICTURE. ITS FUNCTIONS ALSO INCLUDE THE CULTURAL AND ECONOMIC IMPACT ON THE PUBLIC OF PLANNING, ACQUIRING AND OPERATING TRANSPORT SYSTEMS.

THE BUREAU MAINTAINS LIAISON WITH THE HIGHWAY RESEARCH BOARD, THE INSTITUTE OF TRAFFIC ENGINEERS, THE NATIONAL SAFETY COUNCIL, THE BUREAU OF PUBLIC ROADS, RESEARCH FOUNDATIONS, UNIVERSITIES, AND INDUSTRY, ON MATTERS PERTAINING TO ITS MISSION AND FUNCTIONS.

ACCOMPLISHMENTS

MILEPOST SYSTEM

THE PURPOSE OF THIS PROJECT WAS TO DEVELOP THE MILEPOST SYSTEM MOST APPLICABLE TO NEW JERSEY STATE HIGHWAYS, AND TO PREPARE A PLAN FOR IMPLEMENTING IT. MILEPOSTING PROVIDES AN ACCURATE METHOD OF LOCATING HIGH-ACCIDENT LOCATIONS AND CAN BE EFFECTIVELY USED AS A BASE REFERENCE SYSTEM FOR SUFFICIENCY RATING PROCEDURES. A REPORT CONCERNING THE MILEPOST SYSTEM, PREPARED BY THIS BUREAU, WAS PUBLISHED IN *TRAFFIC ENGINEERING* MAGAZINE. ALSO, AN ACCIDENT ANALYSIS SYSTEM HAS BEEN DEVELOPED TO SUPPLEMENT THE MILEPOST SYSTEM. THE MILEPOSTS HAVE BEEN INSTALLED ON ALL OF THE NEW JERSEY STATE HIGHWAY SYSTEM. SEE FRONT PICTURE.

TRUCK EQUIVALENT

THE PASSENGER CAR EQUIVALENT OF A TRUCK — FOR VARIOUS CONDITIONS OF GRADE, VOLUME DENSITY, CURVATURE, ACCELERATION AND DECELERATION — IS BEING DETERMINED ON A CONTINUING BASIS. A REPORT ANALYZING THE TRUCK EQUIVALENCY OF A CAR FOR LEVEL TERRAIN AT A

SIGNALIZED LOCATION HAS ALREADY BEEN COMPLETED; IT WAS PRESENTED AT THE ANNUAL MEETING OF THE HIGHWAY RESEARCH BOARD IN WASHINGTON. FURTHER STUDIES DEALING WITH OTHER CONDITIONS ARE STILL UNDERWAY. THE RESULTS WILL AID IN DESIGN POLICIES AND CAPACITY DETERMINATIONS.

THIRTIETH PEAK HOUR TREND

TO FURNISH THE DESIGNER WITH THE DATA NEEDED FOR IMPROVING THE DESIGN OF OUR HIGHWAY SYSTEM, A STUDY WAS MADE OF THE RELATIONSHIP OF THE DESIGN-HOUR FACTORS TO THE ANNUAL AVERAGE DAILY TRAFFIC. TWO INVESTIGATIONS WERE COMPLETED: THE FIRST ONE UPDATED PREVIOUS FINDINGS OF ANOTHER NEW JERSEY STUDY; THE SECOND ONE STUDIED THE METHODOLOGY USED IN NEW JERSEY BUT APPLIED TO OTHER HIGHWAYS IN ANOTHER STATE. THE REPORT ON THE SECOND ONE WAS PRESENTED AT THE ANNUAL MEETING OF THE HIGHWAY RESEARCH BOARD IN WASHINGTON.

ACCIDENT-DESIGN RELATIONSHIP

ACCIDENT AND INJURY RATES ARE RELATED TO HOURLY TRAFFIC VOLUME VARIATIONS FOR BOTH PASSENGER CARS AND TRUCKS. THE RESULTS OF THE STUDY OF THIS RELATIONSHIP WILL FACILITATE THE SOLUTIONS OF ACCIDENT PROBLEMS BY EXPLAINING THE VARIATIONS IN ACCIDENT RATES AT DIFFERENT LOCATIONS. THIS SHOULD LEAD TO IMPROVEMENTS IN DESIGN AND BETTER SAFETY CONTROL MEASURES. A DEFINITE RELATIONSHIP BETWEEN ACCIDENT RATES AND VOLUME VARIATIONS WAS DETERMINED IN ONE LOCATION; A PRELIMINARY REPORT ON THESE FINDINGS HAS BEEN PUBLISHED IN *TRAFFIC QUARTERLY* MAGAZINE.

INTERSECTION DESIGN

A COMPLETE ANALYSIS OF VARIOUS TYPES OF INTERSECTION DESIGN IS BEING UNDERTAKEN ON A CONTINUING BASIS IN SUCH A MANNER THAT THESE TYPES AND THEIR DESIGN ELEMENTS MAY BE COMPARED. THIS WILL PROVIDE A CRITICAL REVIEW OF THE EFFICIENCY AND SAFETY OF MANY TYPES OF INTERSECTION DESIGN AND WILL ALSO RESULT IN IMPROVED DESIGN POLICIES. THE REPORT, NOT YET PUBLISHED, IS APPROXIMATELY 40% COMPLETE. A PRELIMINARY REPORT HAS BEEN SUBMITTED TO THE HIGHWAY RESEARCH BOARD FOR PRESENTATION AT ITS ANNUAL MEETING IN JANUARY 1968.

SUFFICIENCY RATINGS

THIS STUDY SHOULD PROVIDE A TOOL TO AID IN MORE ADEQUATELY SCHEDULING RECONSTRUCTION PRIORITIES FOR NEW JERSEY STATE HIGHWAYS. IT WILL MEASURE THE RELEVANT PARAMETERS IN ACCORDANCE WITH THE NEEDS OF THE STATE. THE PURPOSE IS TO DEFINE A METHOD FOR DETERMINING RECONSTRUCTION PRIORITIES ACCORDING TO PRESCRIBED STANDARDS, THUS ELIMINATING OR MINIMIZING PERSONAL JUDGMENT. LEGISLATIVE OFFICIALS SHOULD BE APPRISED OF THE CURRENT STATUS OF HIGHWAY FACILITIES AND FUNDS ALLOCATED ON A FAIR STATEWIDE BASIS. ALLOCATION OF FUNDS ACCORDING TO A STRICT ORDER OF NEED WOULD PROTECT THE PUBLIC'S INVESTMENT IN THE HIGHWAY SYSTEM. ANNUAL RATINGS OF THE HIGHWAY SYSTEM COULD INDICATE IF ANNUAL REVENUES FOR HIGHWAY IMPROVEMENTS ARE ADEQUATE. EVALUATING THE HIGHWAY SYSTEM ON A SUFFICIENCY RATING BASIS WOULD HELP TRAFFIC ENGINEERS TO IMPROVE SAFETY. THE FIRST PHASE OF THE STUDY, A LITERATURE REVIEW OF SUFFICIENCY RATING METHODS CURRENTLY IN USE BY OTHER HIGHWAY DEPARTMENTS, HAS BEEN COMPLETED; THE FINDINGS WERE SUMMARIZED IN REPORT FORM. PHASE TWO, THE DETERMINATION OF FACTORS NOT USED BY THE OTHER HIGHWAY DEPARTMENTS BUT PERTINENT TO NEW JERSEY'S HIGHWAYS, IS AT PRESENT BEING CONDUCTED.

ECONOMIC BENEFITS FROM SCENIC ENHANCEMENT OF HIGHWAYS

THE ECONOMIC BENEFITS OF THE SCENIC-ENCHANCEMENT OF HIGHWAYS WILL BE QUANTIFIED UNDER THIS PROJECT AND THE RESULTS COMPARED TO THE ADDITIONAL COST. IF FEASIBLE CONCEPTS CAN BE DEVISED, ALL AVAILABLE DATA WILL BE EXAMINED IN ORDER TO ARRIVE AT A REASONABLE ESTIMATE OF ECONOMIC BENEFITS; IF SATISFACTORY ESTIMATES CANNOT BE REACHED FROM THE STATISTICAL ANALYSIS OF AVAILABLE DATA, THE STUDY WILL SUGGEST METHODS FOR SAMPLE SURVEYS WHICH CAN BE EXPECTED TO YIELD MEASUREMENT COEFFICIENTS. THIS PROJECT IS BEING CONDUCTED IN COOPERATION WITH THE BUREAU OF PUBLIC ROADS AND RUTGERS UNIVERSITY. APPROXIMATELY 75% OF THE REPORT WAS COMPLETED DURING FISCAL YEAR 1967.

DORE

COLORED PAVEMENTS

AN EXPERIMENTAL INSTALLATION OF RED PAVEMENT WAS MADE IN JUNE 1967 ON 280 FEET OF A LEFT TURN AREA AT A CENTER ISLAND OPENING AT THE JUNCTION OF ROUTES 206 AND 68 IN MANSFIELD TOWNSHIP, BURLINGTON COUNTY. COLORED SURFACING IS BEING TESTED TO HELP THE DRIVER TO BETTER DEFINE THE ROADWAYS, RAMPS AND ACCELERATION LANES.

LEFT TURN SPEEDS AS WELL AS ACCEPTED AND REJECTED GAPS, BEFORE AND AFTER THE INSTALLATION, WERE COMPARED. THE RED PAVEMENT SEEMED TO LOWER THE SPEEDS BUT DID NOT CHANGE THE ACCEPTED OR REJECTED GAPS. NOT ENOUGH TIME HAS LAPSED TO DETERMINE THE EFFECTS OF THE TREATMENT ON THE ACCIDENT RECORD. SEE FRONT PICTURE.

BUREAU OF ELECTRONICS AND SCIENTIFIC AIDS

FUNCTIONS

THE MISSION OF THE BUREAU OF ELECTRONICS AND SCIENTIFIC AIDS IS TO PERFORM SCIENTIFIC RESEARCH AND EVALUATION PERTAINING TO ALL THE FIELDS OF SCIENCE WITH EMPHASIS ON ELECTRONICS AND PHYSICS; ITS FUNCTIONS EXPAND INTO THE AREAS OF INVESTIGATION NOT READILY IDENTIFIABLE WITH THE TRAFFIC SAFETY ENGINEER OR THE STRUCTURAL ENGINEER, BUT DEEMED DESIRABLE TO INVESTIGATE TO IMPROVE THE CONSTRUCTION AND MAINTENANCE OF HIGHWAYS AS WELL AS INCREASE THE SAFE FLOW OF TRAFFIC.

ITS PRINCIPAL GOAL IS TO IMPROVE THE CONSTRUCTION, MAINTENANCE AND OPERATIONS OF THE NEW JERSEY STATE HIGHWAY SYSTEM TO THE BEST ADVANTAGE OF THE DRIVING PUBLIC AND THE PUBLIC AT LARGE IN TERMS OF SAFETY, OPERATING COST, TIME SAVING, CONVENIENCE AND COMFORT, AS WELL AS THE NATIONAL ECONOMY AND SECURITY.

THE BUREAU MAINTAINS LIAISON WITH THE HIGHWAY RESEARCH BOARD, THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, THE AMERICAN CHEMICAL SOCIETY, THE BUREAU OF PUBLIC ROADS, RESEARCH FOUNDATIONS, UNIVERSITIES AND INDUSTRY, ON MATTERS PERTAINING TO ITS MISSION AND FUNCTIONS.

ACCOMPLISHMENTS

FOG ABATEMENT

AN EXPERIMENTAL OUTDOOR "FOG BROOM" INSTALLATION HAS BEEN CREATED TO TEST THE DEVICE UNDER ACTUAL CONDITIONS. THIS TWENTY-BROOM, FULLY AUTOMATIC SYSTEM WAS COMPLETED ON JULY 1ST, 1967 AT THE FERNWOOD SHOPS ON PARKWAY AVENUE. TWO DATA-GATHERING FOGS HAVE OCCURRED SINCE THEN. BOTH TIMES, THE RECORDED DATA SHOWED A PARTIAL CLEARING OF FOG AT THE INSTALLATION. THE HISTORY OF THE FOG SEEPING THROUGH THE SITE IS OBTAINED BY RECORDING THE FOG DENSITY, WIND DIRECTION AND WIND VELOCITY. THIS INFORMATION IS PERMANENTLY RECORDED ON A MULTIPLE POINT STRIP CHART RECORDER. TO OBTAIN THE EFFECTIVENESS OF THE BROOMS, THE FOG DENSITY IN THE INSTALLATION IS COMPARED TO A REFERENCE MONITOR WHICH IS LOCATED IN A FIELD AWAY FROM THE POSSIBLE INFLUENCE OF THE FOG BROOMS. WITH EACH FOG OCCURRENCE, MORE IS BEING LEARNED NOT ONLY ABOUT THE CHARACTERISTICS OF THE BROOMS BUT ALSO ABOUT THE CONTROL EQUIPMENT. IT IS STILL TOO EARLY TO MAKE VALUE JUDGMENTS CONCERNING THE INSTALLATION BECAUSE IT IS STILL BEING REFINED, BUT A SUBSTANTIAL FOUNDATION HAS BEEN LAID.

THE ORIGINAL FOG CHAMBER AT THE AIRPORT IS BEING UTILIZED TO DEMONSTRATE THE EFFECTIVENESS OF THE FOG BROOMS IN ARTIFICIAL FOG CONDITIONS. DURING THIS LAST YEAR, OVER 100 PERSONS HAVE VIEWED A DEMONSTRATION IN A CONTROLLED FOG ENVIRONMENT. THE EXPERIMENTS WILL ALSO CONTINUE, TO STUDY THE FACTORS CONTRIBUTING TO THE VARIABLE RESULTS.

A COLORED MOTION PICTURE WITH A NARRATION OF THE EXPERIMENTS WAS PREPARED AND PRESENTED AT THE HIGHWAY RESEARCH BOARD IN JANUARY 1967.

AFTER THE END OF THE FISCAL YEAR, A PORTABLE FOG CHAMBER WAS BUILT AND SUCCESSFULLY USED AT THE N. J. STATE FAIR LAST SEPTEMBER.

FOG STUDIES, FOG LIGHTS AND FOG EYES

STUDIES AND DEMONSTRATION TESTS ARE BEING CONDUCTED TO DETERMINE THE EFFECTIVENESS OF CLOSED CIRCUIT TELEVISION, INFRARED, POLARIZED LIGHT AND ANY PROMISING SYSTEM WHICH MIGHT INCREASE VISIBILITY IN FOG, CONCENTRATING THE EFFORT IN THE AREAS WHICH HAVE SHOWN MOST PROMISE. FOR EXAMPLE, CLOSED CIRCUIT TELEVISION IN ITS PRESENT FORM MAY NOT INCREASE FOG VISIBILITY BUT MAY BE PRACTICAL WITH SPECIAL CIRCUIT MODIFICATION. TRIAL TESTS ON THE HIGHWAY UNDER ACTUAL FOG CONDITIONS WILL SUPPLEMENT EVALUATIONS TAKEN IN THE FOG CHAMBER.

PAVEMENT MARKING AND VEHICLE DIRECTION

THE ACCIDENTS OCCASIONED BY DRIVERS TRAVELING IN THE WRONG DIRECTION ON ANY HIGHWAY CALLED FOR RESEARCH INTO THEIR CAUSE AS WELL AS THEIR PREVENTION. ON THE OTHER HAND, MUCH TIME IS LOST AFTER A MOTORIST STOPS HIS DISABLED CAR ON THE SHOULDER OF A HIGHWAY UNTIL HE RECEIVES THE NECESSARY HELP, AND THE WAITING CAR IS EXPOSED TO REAR-END COLLISIONS. SINCE THERE IS SOME OVERLAP IN THE SPECIFIC OBJECTIVES OF THESE TWO PROJECTS, THEY ARE GROUPED TOGETHER AT THIS POINT.

THE AIMS ARE TO STUDY WAYS OF IMPROVING TRAFFIC BEHAVIOR AND SERVICE BY MEANS OF PAVEMENT MARKINGS, SUCH AS, COLORED TRAFFIC MARKINGS, PAINTED ARROWHEADS ON TRAFFIC LANE LINES AS WELL AS ON THE ENTRANCE AND EXIT RAMPS OF MAJOR ARTERIES. ALSO INVESTIGATE DIRECTION INFORMATION MARKINGS, WHICH WILL AUGMENT THE CUSTOMARY SIGNS, AND DETERMINE THE FEASIBILITY OF SYSTEMS THAT WOULD DETECT STRANDED VEHICLES AND WRONG-WAY VEHICLE MOVEMENT AND GIVE THE NECESSARY WARNING.

HOLOGRAPHY SIGNING

A RECENT REVIVAL OF HOLOGRAPHY, THE OLD PHENOMENON OF "WAVE-FRONT RECONSTRUCTION PHOTOGRAPHY," SUGGESTS SIGNING POSSIBILITIES. AN IMPALPABLE IMAGE OF THE INTENDED SIGN COULD BE PROJECTED ON OR NEAR THE ROADWAY, WHILE THE ACTUAL PHYSICAL STRUCTURE WOULD REMAIN FAR FROM THE ROAD. THERE WOULD BE NOTHING SOLID FOR A DRIVER TO COLLIDE WITH IN THE EVENT THAT HE SHOULD LEAVE THE ROAD INADVERTENTLY. IMAGINARY BARRIERS WOULD BE DISPLAYED TO PREVENT WRONG-WAY DRIVERS FROM ENTERING EXIT RAMPS. THE DEVELOPMENT OF A PROTOTYPE HOLOGRAPHY SIGN IS IN THE PLANNING STAGE, TO SERVE AS AN EXPERIMENTAL ROADSIDE INSTALLATION.

AUDIO SIGNS AND RADIO DIRECTIONS

THESE TWO PROJECTS ARE COMBINED IN THE 1968 AND FUTURE WORK PROGRAMS. INVESTIGATIONS HAVE STARTED TO DEVISE AUDIBLE METHODS FOR INFORMING MOTORISTS OF HAZARDOUS LOCATIONS REQUIRING SPECIAL PRECAUTIONS AND TO ADVISE THEM OF DIRECTIONS TO ALTERNATE ROUTES. THESE SYSTEMS WOULD SUPPLEMENT THE STAND-

ARD VISUAL SIGNS. A WIRE CONDUCTED TWO-WAY COMMUNICATION SYSTEM HAS BEEN DEVELOPED WHICH MAY BE USED TO GIVE RADIO DIRECTIONS AND PRESENT AUDIO SIGNS AND MAY EVEN PROVE ECONOMICAL ENOUGH TO USE IN CONNECTION WITH THE TWO-WIRE EMERGENCY CALL SYSTEM. AN INSTALLATION WILL BE CREATED AND TESTS CONDUCTED. NEGOTIATION WILL BE STARTED WITH COMMUNICATION EXPERTS TO CONSTRUCT A PROTOTYPE AUDIO SIGN SYSTEM, WITH THE OBJECTIVE IN VIEW OF CREATING AN OPERATIONAL SYSTEM.

TALKING PAVEMENTS

IT MAY BE POSSIBLE TO ISSUE AN AUDIBLE MESSAGE TO THE DRIVER OF A VEHICLE BY CONSTRUCTING PROPERLY SPACED CORRUGATIONS IN OR ON THE PAVEMENT, AS AN EXPANSION OF THE "RUMBLE STRIP" PRINCIPLE. DISTINCT CONTOURS HAVE BEEN DETECTED ON "DICTAPHONE" RECORDS OF SEVERAL WORDS; IT IS PROPOSED TO ATTEMPT THE RECONSTRUCTION OF THESE CONTOURS ON AN EXPANDED SCALE IN PAVEMENT SURFACES. FOR EXAMPLE, THE SOUND SIMULATED MAY BE THE WORD "SLOW" WHERE SPEED REDUCTION IS NECESSARY. MOST OF THE EQUIPMENT AND APPARATUS HAVE BEEN OBTAINED. FIELD TESTS OF THE MEASUREMENTS OF SOUND FREQUENCY OBTAINED ON RUMBLE STRIPS AND BRIDGE GRATINGS ARE TO BE CONDUCTED. WHEN THESE ARE COMPLETED, MODEL TALKING PAVEMENT STRIPS WILL BE CONSTRUCTED AND EVALUATED BY USE OF A ONE-EIGHTH SCALED MODEL VEHICLE.

MOBILE TELEVISION SURVEILLANCE

CLOSED-CIRCUIT TELEVISION WITH A VIDEOTAPE RECORDER IS BEING PROBED, AS A MEANS OF ACCUMULATING TRUE RECORDS OF REPETITIOUS ACCIDENTS FOR SUBSEQUENT ANALYSIS. BY RECORDING THE BEHAVIOR PATTERNS OF TRAFFIC PRIOR TO AN ACCIDENT, AN ANALYSIS OF THESE PATTERNS MIGHT LEAD TO CORRECTIVE MEASURES FOR ELIMINATING THIS TYPE OF ACCIDENT. MOST OF THE EQUIPMENT FOR TELEVISION SURVEILLANCE, INCLUDING A VIDEO TAPE RECORDER, IS AVAILABLE. INSTRUCTIONS IN THE USE OF THE SPECIAL SURVEILLANCE EQUIPMENT HAVE BEEN COMPLETED. A PORTABLE POWER SUPPLY IS BEING EVALUATED AND ADAPTED FOR THIS PROJECT.

EMERGENCY CALL SYSTEM

SEVERAL METHODS, WHICH WILL PERMIT THE DRIVER OF A DISABLED VEHICLE TO SUMMON ASSISTANCE FROM NEARBY SERVICE AGENCIES, ARE BEING INVESTIGATED. THESE SYSTEMS WILL BE ESPECIALLY USEFUL TO MOTORISTS ON THE INTERSTATE SYSTEM OF HIGHWAYS WHERE NO SERVICE AREAS ARE INCLUDED WITHIN THE LIMITS OF THE RIGHT-OF-WAY. ESPECIALLY PROMISING IS THE TWO-WIRE RESISTANCE MEASUREMENT SYSTEM. ONE MILE OF WIRE HAS BEEN INSTALLED AND SUFFICIENT DATA WERE COLLECTED TO INDICATE THAT IT WILL WORK OVER EXTENDED INTERVALS. A FULLY OPERATIONAL PROTOTYPE CALL SYSTEM IS TO BE INSTALLED ALONG THE HIGHWAY FOR TRIAL AND EVALUATION.

NOISE MEASUREMENTS

DATA WILL BE GATHERED PREVENTIVELY IN THE DEFENSE OF THE STATE AGAINST POSSIBLE LAW SUITS BECAUSE OF ALLEGED DAMAGES DUE TO POSSIBLE INCREASED NOISE LEVELS AFTER COMPLETION OF HIGHWAY PROJECTS. THE OCCASION FOR THIS STUDY WILL BE THE INTRODUCTION OF A SECTION OF INTERSTATE 287 IN THE VICINITY OF THE GEORGE WASHINGTON SCHOOL IN MORRISTOWN. NOISE LEVEL MEASUREMENTS ARE TO BE MADE BOTH WHEN SCHOOL IS IN SESSION AND NOT IN SESSION, PRIOR TO THE CONSTRUCTION OF THE HIGHWAY AND SUBSEQUENT TO ITS COMPLETION. A CONTRACT WILL BE NEGOTIATED WITH THE LEADING EX-

PERTS IN THE FIELD OF ACOUSTICS TO CARRY OUT THIS PROGRAM.

VEHICLE EXHAUST POLLUTION

THE PROBLEM OF AIR POLLUTION FROM AUTOMOTIVE EXHAUSTS IS BECOMING MORE SERIOUS EVERY YEAR. AS ITS CONTRIBUTION TO THE NECESSARY RESEARCH, THIS BUREAU HAS STARTED A PRELIMINARY SEARCH FOR THE BEST METHODS TO ELIMINATE THE NITROGEN OXIDES, WHICH ARE VERY HARMFUL TO HUMAN HEALTH BUT HAVE NOT BEEN INVESTIGATED BY ANY OTHER AGENCY AS YET.

THIS PROJECT WILL BE CONDUCTED ON TWO LEVELS OF EFFORT. A CONTRACT IS BEING NEGOTIATED WITH M. W. KELLOGG RESEARCH DIVISION TO PERFORM STUDIES TO ELIMINATE OR REDUCE OXIDES OF NITROGEN IN AUTOMOBILE EXHAUST. THE BUREAU WILL PERFORM ITS OWN INVESTIGATION EMPHASIZING THE TOTAL STUDY OF VEHICLE EXHAUST POLLUTION CONTROL. IT IS PLANNED TO CREATE VARIOUS EXHAUST CONTROL DEVICES TO INSTALL THEM ON TEST VEHICLES AND TO COLLECT EXHAUST GASES. THE FUTURE GOAL WILL BE THE ENGINEERING OF AN EXHAUST POLLUTION CONTROL SYSTEM FOR OPERATIONAL VEHICLES.

PAVEMENT HEATING

EXPERIMENTS WITH PAVEMENT HEATING WILL BE MADE TO DETERMINE THE EFFECTIVENESS OF ELECTRIC HEATING TAPE AND PIPES CONDUCTING HEATED FLUID FOR MELTING SNOW AND PREVENTING THE FORMATION OF ICE ON ROADWAYS. FURTHERMORE, THE REQUIREMENTS OF REINFORCING MATERIALS MAY BE REDUCED, BECAUSE OF THE POSSIBILITY OF MAINTAINING RELATIVELY CONSTANT TEMPERATURES IN THE PAVEMENTS THROUGHOUT THE YEAR. PLANS ARE BEING PREPARED FOR THE INSTALLATION OF A SERIES OF SECTIONS OF PORTLAND CEMENT AND BITUMINOUS CONCRETE. THESE SECTIONS WILL INCORPORATE ELECTRIC HEATING TAPES AND PIPES TO CONDUCT HEATING FLUID. THE PIPES WILL BE OF VARIOUS MATERIALS, VARIOUS SIZES, AND VARIOUS SPACINGS. THE FLUID TO BE CIRCULATED WILL BE HEATED BY MEANS OF: (A) SOLAR ENERGY STORED IN HEAT SUMPS; (B) NORMAL GROUND HEATING TRANSFER; AND (C) HEAT PUMPS (BOTH SUBSURFACE HEAT AND AIR HEAT). LATER ON THESE SYSTEMS MAY BE INSTALLED IN NEW HIGHWAY BEDS AT THE TIME OF CONSTRUCTION, PARTICULARLY AT INTERSECTIONS AND WHERE CHANNELIZATION OF PAVEMENTS MAKE SNOW PLOWING EXTREMELY DIFFICULT.

DORE

END-THOUGHT

....AND NOW, LET US BELIEVE
IN THE LONG YEAR THAT IS GIVEN TO US,
NEW, UNTOUCHED,
FULL OF THINGS THAT HAVE NEVER BEEN

(Rainer Maria Rilke)

DORE

APPENDIX-TABLE IV

REPORTS BY
DIVISION OF RESEARCH & EVALUATION

REPORT NUMBERS	TITLES	BUREAUS		
		S.M.	S.T.	E.S.
1.	Composite Pavement Route 3, 1st Interim Report	X		
2.	Report on Pilot Operation of the Fog Screen	X		
3.	Experimental Pavement Project Routes 80 & 95, 1st	X		
4.	Pavement Investigation, Route 295, Section 2F	X		
5.	Experimental Pavement Project Routes 80 & 95, 2nd	X		
6.	Undistributed Sampling of Subbase Materials and Soils	X		
7.	Operational Effects of Overall Geometrics on Safety		X	
8.	Air Pollution Control Interim Report			X
9.	Evaluation of Reflectorized Highway Signs		X	
10.	Reinforced Bituminous Overlays in New Jersey	X		
11.	Low Level Bridge Lighting Installed in New Jersey		X	
12.	Pavement Investigation Route 78, Section 2J	X		
13.	Investigation of Asphalt Paving Problems in N.J.	X		
14.	A Mile Post System for New Jersey		X	
15.	30th Peak Hour Trends, 1964		X	
16.	Relationship of Accident Rates and Involvement		X	
17.	Investigation Route 72 West Approach, Manahawkin	X		
18.	Composite Pavement Route 3, 2nd Interim Report	X		
19.	Signalized Intersection Accident Report, 1964		X	
20.	Summary of Sufficiency Rating Elements		X	
21.	Socio-Economic Impact of Verrazano Narrows Bridge		X	
22.	30th Peak Hour Factor Trends		X	
23.	An Evaluation of New Pedestrian-Actuated Signal		X	
24.	Truck Equivalent		X	
25.	Evaluation of Studded Tires (Report & Paper)	X		
26.	Progress Report on Fog Removal Experiments			X
27.	Lateral Placement and Stopping Distance		X	
28.	A Variance Analysis of Asphaltic Concrete (Report & Paper)	X		
29.	Preformed Elastomeric Expansion Joints (Report & Paper)	X		
30.	Corrosion Tests for Low Alloy Steels (Report & Paper)	X		

	S.M.	S.T.	E.S.
31. Intersection Design		X	
32. Can Traffic Accidents be Reduced Significantly		X	
32A. New Concepts in Highway Design		X	
33. Two-Wire Emergency Call System			X
34. Composite Pavement Route 3, 3rd Interim Report	X		
35. Reflective Pavement Marking, Introductory Report		X	

The method of numbering the research reports has been changed effective July 1, 1967. Henceforth, each report will be numbered using:

Two digits indicating the Fiscal Year
Three digits indicating serially the report within the year
Four digits identifying the research project being reported

An indication of whether the report is an Interim or Final Report will be included on the cover sheet.

68-001-7702	Experimental Pavement Project (Route I-80 Section 5V and Route I-95 Section 1R) 3rd Interim Report	X		
68-002-7706	Intersection Design—Fall 1967		X	
68-003-7760	Dolomite Study—Relative Skid Resistance of Bituminous Concrete Pavement Surfaces Containing Dolomite Course Aggregates	X		
68-004-7754	Rumble Strips	X		
68-005-7702	Experimental Pavement Project (Route I-80 Section 5V and Route I-95 Section 1R) 4th Interim Report	X		
68-006-7705	Capacity of Design Features, Detour Route Around Route 21 Viaduct-Newark		X	
68-007-7767	Fog Abatement Progress Report			X
68-008-7785	Evaluation of Metallic Bridge Decks	X		
68-009-7704	Truck Equivalency		X	
68-010-7771	Colored Pavement		X	
68-011-7789	Yield Sign Study		X	

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